GAS JOURNAL

LIGHT ∴ HEAT ∴ POWER

BYE-PRODUCTS.

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXXX.

OCTOBER TO DECEMBER, 1927.

LONDON:

WALTER KING, LTD.,

11, BOLT COURT, FLEET STREET, E.C. 4.

1927.

CONTENTS.

EDITORIAL NOTES.

Accident to Sir Russell Bencraft 19
The Waterless Holder in Service at Ipswich . 19
Transformation at the Cambridge Gas-Works 20
Governing and Pressure Complications . . 20
Gas Production and Blending, and Coke Sales 21
Institution Examiners' Criticisms 21
Inserting Large Valves under Pressure—Furnace Atmosphere and Refractory Material—A Fine Ferro-Concrete Bridge—Price Reduction and Meter Reading—Company Law—Future Price of Oil—Taxation Burdens 22
"T.U.C." President and a New Spirit—Miners' Wages and a Serious Problem—Trade Union Political Funds 23

Personal 23
Obituary 23
Forthcoming Engagements 24
Electricity Supply Memoranda 24
Southampton Conference of the "B.C.G.A." 25
Eastern Counties Gas Managers' Association—
Inauguration of a 3 Million C.Ft. Holder . 26
Luncheon 26
Business Meeting 27
Alterations at the Cambridge Gas-Works between the 1910 and 1927 Visits of the Association. By J. W. Auchterlonie . 34
Some Notes on Automatic Governing and a Self-Loading Station Governor. By W. Carmichael Peebles 43
A Fine Ferro-Concrete Bridge at the Willoughby Lane Gas-Works at Tottenham 28
Borough of Lancaster Gas Department Centenary Celebration—Official Inspection of New Inclined Chamber Plant 29
Sulphur in Gas Coke 42
A Blended National Coke? 42
Notes on New Books 46
Gas Blending. By Norton H. Humphrys . 47
Inserting Large Valves in Mains under Pressure—Illustrations of the Ruscoe Process . 48
Wales and Monmouthshire District Institution of Gas Engineers and Managers—
Present-Day Problems. By T. Anthony Canning, F.C.S. 49
Great Britain's First Waterless Holder . . 52
British Association Meeting—
Invention as a Link in Scientific and Economic Progress. By Prof. Sir James Henderson 54
Accident Causation. By Eric Farmer . . 54
Education and Industry 55
Institution of Public Lighting Engineers—
Street Lighting and Traffic Problems as Seen by a Chief Constable. By R. L. Matthews, O.B.E. 55
"Hailglass"—Artistic Lighting in Home and Industry 56
Inauguration of Glover-West Verticals at Leven 57
Inauguration of Gas and Electrical Extensions at Aldershot 58
Mr. Butterfield on the Gas Industry—Past, Present, and Future 60

CORRESPONDENCE.

Manner of Working Water Gas Plants . . 60

REGISTER OF PATENTS.

Heating Coke Ovens—Still, C. 61
Geysers—Hudson, J. J. C. & G. C. 61
Burners for Solid Hotplate Cookers—Haddan, R. 61
Enriching Water Gas—Gibson, J. W. . . 61
Coal Washing Plant—The Illingworth Carbonization Company, Ltd., and Illingworth, S. R. 61
Recovery of Phenol, &c., from Gas Liquor and "Devil" Liquor—Shadbolt, S. M., and the Chemical Engineering and Wilton's Patent Furnace Company, Ltd. 61
Prolonging the Life of Furnace Linings—Toogood, H. J., and Robert Dempster & Sons, Ltd. 62
Low-Temperature Carbonization—Synthetic Ammonia and Nitrates, Ltd., Slade, R. E., and Harrison, C. F. R. 62
Carburetted Water Gas from Coal—Misch, O. 63
Applications for Patents 63

MISCELLANEOUS NEWS.

Institution of Gas Engineers—
Examinations in Gas Engineering and Gas Supply, 1927—Abstract of Examiners' Report 63
Diploma Results, Education Scheme . . 64
Exeter Gas Company—Further Capital . . 64
Tynemouth Gas Amalgamation 65
British Gas Light Company, Ltd. 65
Continental Union Gas Company 67
New Yorkshire Welsbach Depôt 68
Alliance and Dublin Consumers' Gas Co. . 69
Gas Regulation Act Applications 69
Trade Notes 69
Stock Market Report 71
Coal Trade Reports 72
Coal Consumption in 1926 72
Current Sales of Gas Products 72

PARAGRAPHS.

Counting Pipe in a Pile—Gas for a Football Club 23
Conference on Methods of Coal Analysis—"A Tragedy of the Law" 28
Royal Sanitary Institute—Smoke Problem on Tyneside 33
Sixth National Cost Conference 47
Institution of Chemical Engineers—Scottish Junior Gas Association 56
Lower Gas Charge at Spenborough—Price Reduction at Birstall—Retirement of Birmingham Gas Department Employees . . 69
Importance of Advertising—Gas at a Leeds Exhibition—Gas Price Lowered at Dorchester—Results at Elsecar—Further Price Reduction by the Gas Light and Coke Company—Reduction in Price at Clitheroe—Revised Charges at Coventry—Tamworth Gas Company — Successful Working at Lewes—Issue of Stock at Bognor—Good Results at Buxton—Loss at Teignmouth—Reduction at Wolstanton—Gas Cheaper at Matlock Bath—Leicester Gas Prices—Gas Exhibition at Elland—Cheaper Gas at St. Columb 70
Reduction at Helston 72

For List of "JOURNAL" Advertisers, see p. 73.

— ONLY —

GENERAL

GAS COOKERS

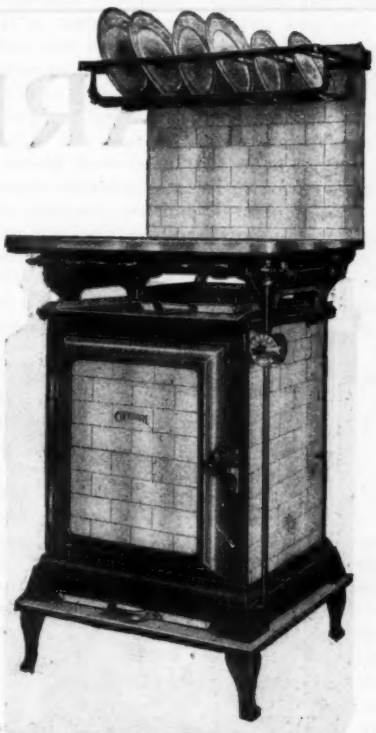
are fitted

WITH AN OVEN THERMOSTAT

Regulated

FROM THE FRONT

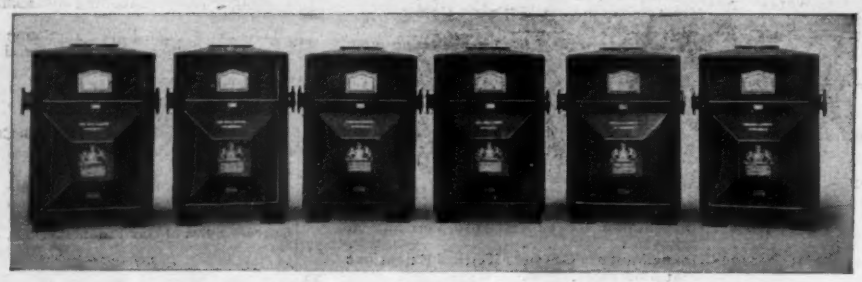
WORKS:—GUIDE BRIDGE, MANCHESTER



No. 1 TRIUMPH COOKER showing:—

ECONOMIC AUTO-HEAT REGULATED

fitted in position.



METERS — Large & Small

With the 83 years' reputation for quality behind them. Unsurpassed for accuracy and durability. Manufactured throughout of finest materials by the most expert craftsmanship.

ORIGINAL DRY METER MAKERS
ESTABLISHED IN 1844

THOMAS GLOVER & CO. LTD.
GOTHIC WORKS, ANGEL RD. EDMONTON, N.18

Branches at: BELFAST, BIRMINGHAM, BRISTOL, EDINBURGH, GLASGOW, MANCHESTER & NEWCASTLE-ON-TYNE

PARKINSON'S

DRY METERS.

"STANDARD" or "LIGHTS" Type.

WRITE FOR PRICES:

W. PARKINSON & CO.,

INCORPORATED IN PARKINSON & COWAN (GAS METERS), LTD.

COTTAGE LANE, CITY ROAD, LONDON, E.C.1.
Telegrams: "INDEX, ISLING, LONDON."
'Phone Nos.: 4270 Clerkenwell

BELL BARN ROAD, BIRMINGHAM.
"GASMETERS, B'HAM."
2945 Midland, B'ham.

MORNINGTON STREET ORMEAU ROAD, BELFAST.
"PREPAYMENT, BELFAST."
3574 Belfast.

GAS JOURNAL

LIGHT ✂ HEAT ✂ POWER ✂ BYE-PRODUCTS

(Founded in 1849 as the "Journal of Gas Lighting.")

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Central 6055. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXXX., No. 3359.] WEDNESDAY, OCTOBER 5, 1927. [79TH YEAR.

EDITORIAL NOTES.

Accident to Sir Russell Bencraft.

GREAT was the sorrow of the members of the British Commercial Gas Association to learn, on their arrival at Southampton on Monday for their annual conference, that their President (Sir Russell Bencraft, M.R.C.S.E., J.P.) had met with an accident which would deprive them of his genial presence and directive wisdom. Sir Russell is the Deputy-Chairman of the Southampton Gas Company, the Chairman (Mr. J. C. Moberly, M.A.) and Directors of which were the generous hosts of the members on board the R.M.S. "Majestic" on Monday evening. On the day of the accident, Sir Russell had been to the gas office to see the Managing Director (Mr. J. R. H. Jacobs). On leaving, he was about to cross the road, but in the misty rain did not notice an approaching motor lorry, and was knocked down. The latest report before going to press is that Sir Russell is making satisfactory progress; and that in all probability within a fortnight he will be able to leave his room. One of his colleagues on the Board (Col. E. K. Perkins, C.B.E., M.P., D.L., J.P.) kindly presided at the dinner on the "Majestic," and on Tuesday read Sir Russell's Presidential Address. We unite ourselves with the regrets of the members over his accident and absence from the business and social sides of the conference, and with their heartfelt hope for a rapid recovery.

The Waterless Holder in Service at Ipswich.

GUIDE-FRAMED and spiral-guided holders are not now the sole representatives of town gas storage in this country. The Ipswich Gas Company (to be followed closely by the Gas Light and Coke Company, and, we believe, others) are the pioneers in the introduction into active service of a holder of the waterless type; and so Ipswich will have an honoured place in the history of changes in gas-engineering structures in Great Britain. The holder was inaugurated last Thursday, when the Chairman of the Company (Mr. Henry Woodall, M.Inst.C.E.) opened the valve which admitted gas into it. The little ceremony was performed in the presence of the Mayor (Mr. C. E. Tempest), the Director of Gas Administration (Mr. J. F. Ronca), and several guests—professional and otherwise. The formal starting of the new possession into working operation was followed by a lunch, at which the Chairman and Directors of the Company and their Engineer and Manager (Mr. Frank Prentice) were heartily congratulated on their enterprise. If good wishes are fulfilled, then the holder will have a long life of excellent service, with complete happiness on the part of those who will be responsible for its supervision and functioning. We heartily unite ourselves with those wishes.

The holder (which was erected by Messrs. Cockey & Son) has a capacity of 2 million c.ft.; its diameter is 123 ft.; and it commandingly and permanently figures in the landscape with a height of 210 ft. His Worship the Mayor asserted that it was possible to see Harwich from the top of the holder; probably on a fine day, from suitable vantage ground, it will be possible for the people of Harwich to gain a view of the Ipswich Gas Company's never descending tower. Probably, however, it will not be so conspicuous from the distance as might be imagined. Its colour is to be French grey, which will assist the new structure to merge itself better into its surroundings than if the conventional and more obtrusive red dressing was applied. It is somewhat a mystery why red paint for gasholders has had such a long innings without any considerable challenge. The total weight given for the new holder is 800 tons, which, of course, is relatively small to that of a water-tank holder of the same size, and Mr. Woodall stated that the cost of the structure was very much less than would have been that of any other type. This is an important consideration. But we have not the actual sum of the contract, so that no comparison can be made. There are working costs to discount the saving in capital expenditure. The supervision required, the replenishing of the tar seal, and attention to the pumps are not obtained for nothing. They will, of course, be day-by-day charges. Mr. Woodall recognizes this in saying the savings due to this type of holder are much greater than the extra costs, altogether apart from any saving due to constant pressure. That is another point claimed for the holder. The Chairman declares it will give constant pressure, and will save the cost of boosting. The holder may give initial constant pressure; constant pressure, however, in the distributing system does not depend only upon the functioning of a holder, several other factors being brought into play. The holder may remove one factor in pressure inconstancy, but it will not remove them all; and we can easily imagine circumstances in which boosting may still be necessary.

However, if there is economy and increased service efficiency in this type of holder, then by all means let the British gas industry enter into the enjoyment of the gains. There are many gas engineers who are doubtful as to whether the Ipswich type of waterless holder really represents the ultimate form of internal construction and operation. There are also not a few who will want to learn of actual experiences in working in this country; and more regarding the capital costs and benefits which Mr. Woodall did not define in terms of money or any other measure that enables better appreciation than generalities. But we are certain that neither Mr. Woodall nor Mr. Prentice will decline later on to make full disclosure of experiences in respect of working and savings, even if

they do not reach the level of their expectations. However, the Ipswich holder, those under erection, and those to be erected under orders which have been placed, will give the gas profession a new interest in gas storage, and a fresh subject for comparative discussion with data obtained in different circumstances.

Transformation at the Cambridge Gas-Works.

There is only one thing to which there can be objection about the paper which Mr. J. W. Auchterlonie presented to the members of the Eastern Counties Gas Managers' Association at their meeting last Friday. It is that it reminds us that he has been Engineer and Manager of the Cambridge Gas Company for a quarter of a century, and that it is seventeen years since the Association last made an official visit to the works. *Tempus fugit.* Without his reminder, we should have said that half the number of years would have about dated the latter event and its pleasant recollections; but remorseless time plays tricks with memory. However, to remind of the flight of time was not the intention of the paper; its object was to provide technical interest for the members by describing the many alterations which have been made at the works since they were there in 1910. The author's account of the changes succinctly details the work—and, by numerous excellent photographs and drawings, illustrates the special features—the whole combining to show the large claims that have been made upon the Company and their Engineer during the period under review. In brief, the works have been transformed in a manner which every expert can approve, and they show (as anyone who knows Mr. Auchterlonie would expect would be the case) care and skill in both design and selection.

All the change which has been effected has been demanded by progress—progress of business and of efficiency in modern processes. Since the last visit of the members, the make of gas has more than doubled—having been, in 1910, 402 million c.ft., and in the twelve months ended June last 816 millions, which is an increase of 103 p.ct. An interesting fact is that in 1910 the maximum day's make was 1·76 million c.ft., and in the year ended June last 3·57 million c.ft., or just about 102 p.ct. difference. Thus the maximum day's make has maintained its proportion with the general advance of the Company's business. In those data, we have good reason for the transformation of works by extension and conversion of plant, many new and imposing introductions, and the scrapping of those parts which were obsolete and inefficient. The tale is best left as written in Mr. Auchterlonie's paper, in the course of which several auxiliaries to the main plant will be found to have been incorporated which enlarge working efficiency and extend the range of productive capabilities. In connection with the water-gas plant, we notice that Parker's grit catchers have been applied, and these have considerably mitigated the coke dust nuisance on the works. Associated with the "T.I.C." plant, which is capable of dehydrating 20 tons of tar per day, is a bitumen melting-pot, with two 1000-gallon tanks, for preparing bitmen-tar mixtures in any proportion as desired by the road authorities. A new centrifugal washer is specially interesting, in which the gas is subjected to spiral travel from inlet to outlet.

But such things as these are only incidental to the large amount of structural work which has been carried out during the time intervening the visits of the Association in connection with the carbonizing plant, coal and coke handling equipment, purifiers, exhausters, and storage. In connection with the new 3 million c.ft. holder, a retaining and boundary wall had to be constructed. Its design—with gradual sloping base, which defies the assaults of the weather and prevents the lodgment of rain, and with provision in the body of the work for expansion and contraction—is distinctly good.

The technical and commercial progress that the Company have made during the period of Mr. Auchterlonie's engineership and management, is something upon which there may be, as there was last Friday, the heartiest congratulation of the Chairman and Directors, their chief official, and all concerned in the undertaking.

Governing and Pressure Complications.

It requires an expert to deal with the complex problems involved in the governing of pressures in gas distribution systems. Though Col. Carmichael Peebles did not set out to declare this in his paper before the Eastern Counties Gas Managers' Association last Friday, it abundantly and successfully proved that it is so. His purpose was to give an account of the development of gas governing, and to supply particulars of the latest forms of apparatus, and in connection with them to instance problems which arise in governing. In the concluding part of the contribution, he expressed the hope that he had succeeded in stimulating the interest of the members, not merely in the particular piece of apparatus described, but in the question of governing generally, which is a fascinating subject, and has endless ramifications. Of the ramifications the gas manager knows only too well, and for the assistance he has obtained in exercising a greater control over the vagaries of pressure created by inconstant demand, he is very grateful to the manufacturers of governors, and to those whose minds are constantly directed to ascertaining how improvements can be made.

The difficulties are great. The developments of gas applications and the widening of the variations of daily and seasonal demands are constantly warring against uniformity of pressure at any point in the distributing system. Heavy demand on Sunday during the cooking hours throughout the distributing system in residential areas, fluctuating industrial demand during the week in many districts, the flights and recessions of demand in winter through large differences in atmospheric conditions, all combine to make the problems of regulating pressures extremely troublesome. The fact that there is so much success in most supply areas in giving the pressure needed is largely due to the sufficiency in capacity of the distributing system, and the ingenuity of those who have devised and have brought governors to such a high state of precision in complying with requirement. In such complex circumstances as those which obtain to-day, there must be, as Col. Peebles says, the closest co-operation between manufacturer and user, in order to achieve the best results. Not only should full particulars be given to the manufacturer as to the maximum and minimum pressures to be dealt with, and the maximum and minimum consumption or load, but the manufacturer should be taken into counsel so that he may the better study and advise regarding provision to meet the local conditions to be dealt with. However, we are afraid that the ideal of constant pressure to each gas consumer at all times and in all circumstances will never be realized, other than by an individual governing of the service. Of course, it would matter little how much the pressure varied in different parts of the system in the district if each consumer obtained uniform pressure on his premises. But the capital cost, labour, and maintenance which would be involved by individual service governing would be enormous; and therefore, the next best thing is to ensure as nearly as possible equality of pressure in the mains in the different parts of the supply area by the various expedients at command.

Col. Peebles' paper gives an historical résumé of the work which led-up to the present constructions for automatic station governing, and which are, as the author says, "beautifully accurate machines," with their "present-day efficiency due more to small refinements and greater accuracy of workmanship than to any important change in principle." The automatic self-loading governor to which he devoted most attention is that which depends for its action on the moment about the valve stem of a rolling weight. The paper is a highly valuable one; and we are confident it will have the effect for which Col. Peebles hopes—it will stimulate greater interest in the subject of pressure governing in the complicated conditions which the developments of the gas business have brought about.

Gas Production and Blending, and Coke Sales.

THE present-day problems of the gas industry are many; and from them, as in the past, new ones will arise. This is consistent with the laws of evolution and progress. But it is not always evolution or progress which produces change; it is sometimes purely commercial interest, as instanced by the utilization of foreign-bought materials for our roadways, instead of home-produced ones, which are better and more economical. But, as a rule, change which does not register progress does not live long. This by the way, although it was one of the matters mentioned in an excellent paper by a new contributor to a senior Gas Association—Mr. T. Anthony Canning. The paper, which bore the heading "Present-day Problems," was presented at the meeting of the Wales and Monmouthshire Institution, last Thursday week, held at Porthcawl under the presidency of Mr. A. T. Kyle, of Abergavenny. The President of the Institution of Gas Engineers (Mr. H. D. Madden, M.Inst.C.E.) was also there; and, as our report showed, our Welsh friends are highly gratified that one of their number is now occupying the highest office the gas profession can bestow. In addition to the problems dealt with by Mr. Canning, the members also considered that highly important one of "Service to the Consumers," which was introduced by Mr. W. Clark Jackson in a paper prepared for the Spring Meeting, as published and commented upon in our issue of May 25 last.

Mr. Canning's paper is published to-day; and we will take two or three of the topics for comment, as, while the others are interesting, these are outstanding. In the first place, he states that even now considerable difference of opinion exists as to the respective merits of the eight and twelve hour systems of carbonization in horizontal retorts; and he suggests that it would be in the best interests of the industry that the subject should be thoroughly investigated, and a comparison made of the respective values of each. In our opinion, such an investigation would be supererogatory in view of the extensive experience and mass of working data at command, which leave no room for question as to which is the more economic system for, at any rate, medium and large undertakings. Moreover, Mr. Canning's mind is fully made up that twelve-hour working is, all things considered, incontrovertibly the better. That is the verdict of all prominent engineers who long since increased the duration of their carbonizing by 50 p.ct., and simultaneously the weight of charge; and for years they have been having day-by-day corroboration of the wisdom of the change. The eight-hour carbonization period may perhaps rightly claim a yield of gas of fairly uniform calorific value throughout the twenty-four hours; and this might be an advantage, if there were no countervailing disadvantages, to the small works. But the medium-sized and large works can take good care of themselves in this respect by the process of overlapping charges, in which case it is surprising, given concordant conditions, how fairly straight is the calorific power curve from the stream of gas, as shown by a continuously recording calorimeter. The advantages of the twelve-hour system, as presented by Mr. Canning, would be hard indeed to depose from the position they hold.

However, it has now become a question whether we shall not in time have to revise completely our ideas as to charge duration. As was noted last week in our editorial columns, work is now proceeding with the view of ascertaining whether beneficial effects cannot be realized by treating charges in a manner which will speed-up carbonization. Prof. Cobb and his staff are delving into this problem. It is easy to see that if we can, without anything detrimental happening, exceed the present speed limits in carbonization, then there will be much advantage in the increased throughput per unit of plant; if, further, the products are benefited by the new process, all the greater the gain. At any rate, we are hoping that new methods are coming to aid in advancing our economic status in respect of carbonization.

Mr. Canning also deals with the question of the best place and method of diluting high-grade gas with blue water gas, with the view of approximating the mixture to the declared calorific value. In his opinion, the dilution should be arranged before the gas enters the holders, and not in the holders themselves. We agree with him in this, having regard to the tendency of gases of different specific gravities to stratify if admitted to holders separately; only complete admixture before admission suffices. The author has a good word for the system whereby the coal-gas exhauster draws upon the water-gas relief holder—the water gas passing through a rotary meter on the way to the coal-gas stream in order that its volume may be individually measured. For delicacy of control he also suggests that the connection from the water-gas main to the inlet of the coal-gas exhauster should consist of a series of service-pipes of suitable diameter, each provided with a valve, which would give an exactitude of control according to need. The passing of the two gases through a common exhauster, he submits, achieves a fineness of mixture which is impossible under any other system. Mr. Canning has rightly a careful regard for the maintenance of calorific value in close proximity to the declared value; but in doing this by blending gases of different densities, care must be taken to keep the specific gravity of the mixture fairly level so as not to injure the efficiency of combustion on the consumers' premises.

Among other present-day problems with which the author dealt was that of the development of the coke market. He sees, subject to proper procedure, great opportunities for this among domestic consumers, and he has little fancy for relying upon a fluctuating demand from abroad. He is sound in his suggestions and advice. Coke is a product that is so valuable to the gas business that it should receive consideration with gas production *ab initio*, and right through to its preparation for the market. We could never see why coke should be regarded as a product which should not be taken into calculation when purchasing coals; nor why coals should not be blended in a manner to effect structural improvement in the coke, always providing that advantage is shown in the combined gas and coke results. The purity and physical properties of coke and the need for grading were also dealt with in the paper. They are subjects which have been much discussed; but so long as such essentials are neglected, which necessitates constant hawking instead of securing a stabilized demand, the requirements must be emphasized. The author is an advocate for placing business development in coke on the same plane as gas—even to the setting-up of a National Coke Association, on the lines of the London Coke Committee, for propaganda and educational purposes. Gas, tar, and sulphate of ammonia have organizations looking after their interests on a national basis. Why not coke? The whole paper is directed to the remedying of defects, and making them starting-points for fresh advances.

Institution Examiners' Criticisms.

IN some respects, the report of the examiners in the Institution Examinations in "Gas Engineering" and "Gas Supply" is very disappointing. It is clear from what is said in the abstract of it, as published in other columns, that the examiners are anything but satisfied with the standards of general educational qualification which the candidates show—with, of course, exceptions, and, as a rule, the exceptions are very good. We want well-educated youths in the gas industry to train for its responsible work. But consider this remark under "College Examinations:" "There is much room for improve-" ment in clearness of statement, spelling, handwriting, " and sketching." That is not as it should be. The things mentioned are fundamental requirements in a man studying for a professional career. A curious thing about this is that we get from the examiners an observation which shows that even those who are deficient in the respects named are satisfactorily trying to gain in technical knowledge. It is stated: "The general stan-" dard of the answers is an advance on previous years;" and, under "External Examinations," we read, respecting the Gas Engineering ordinary grade: "Generally " speaking, the questions were answered in a satisfactory " manner, considering the age and experience of the can-" didates." But in sketching, while some of the candidates were "very good indeed," ordinarily the poor quality of

the sketches was responsible for the loss of a large number of marks. The examiners' advice to candidates should be carefully studied by future aspirants. Regarding the higher grade in Gas Engineering, it is gratifying to find that the work this year is an improvement on the three previous ones; but again there is criticism of the quality of sketches. For the diploma in Gas Engineering, the written papers proved rather disappointing; and the theses were not up to the standard of the two previous years. In fact, a number could not be described as theses at all; there was a decided absence of original thought and investigation. In future, it is proposed to publish some months beforehand a list of subjects from which, if he chooses, a candidate may select one for his thesis. This should be very useful. The criticisms do not apply especially to any given part of the country; the examiners for Scotland hold like opinions. There is too much evidence of text-book learning, and insufficient derived from individual experience, observation, and investigation. In one part of the report, we find some consolation. The examiners state that, though they have offered criticisms for the guidance of teachers and students, they desire to say that the tone of the work this year is an improvement on that of previous years, and that candidates are showing, by the manner questions are answered, benefit as the result of their training in cognate subjects. A study of the analysis of the results of the examination as given at the end of the report supplies more comfort than might have been expected from the criticisms of the examiners. However, the criticisms must be allowed to act not as a deterrent, but a spur to the attainment of higher standards which will be individually of advantage, and will alter entirely the complexion of the examiners' report. Candidates should appreciate that the gas industry does not want superficially educated persons for responsible positions in its undertakings; it wants thoroughly qualified men—and must have them.

Inserting Large Valves under Pressure.

A piece of work which will greatly interest gas engineers is described on later pages. To Mr. Hubert Pooley, M.Inst.C.E., Engineer and Manager of the Leicester Corporation Gas Department, we are indebted for supplying the photographs which, in themselves, show the method adopted by Messrs. Ruscoe & Co., of Hyde, for inserting 24 and 16 in. valves into mains under gasholder pressures, and while at work. We do not remember that the process has been previously illustrated.

Furnace Atmosphere and Refractory Material.

Readers will recall the paper on the "Effects of Furnace Atmosphere upon Refractory Materials" presented at the meeting of the Institution of Gas Engineers last June by the Refractories Research Committee. In our "Register of Patents" to-day, a notable case of contemporary working comes to light. As far back as May 17, 1926, Mr. H. J. Toogood and Messrs. Robert Dempster & Sons, Ltd., made application for a patent for "Improvements in, or relating to, Furnaces." They then set-forth their practical experiences, and portrayed zones of varying damage to furnace linings; thus realizing the different type of damage occurring as the furnace atmosphere changes along the heated furnace linings, according to the distance from the firebars. The inventors, it will be seen, seek to turn to account the fact that with a modern waste-heat (surplus heat) boiler, the products of combustion are under pressure, which pressure-products are simply piped to the furnaces, and used adjacent to the furnace lining to displace the steam-water-gas atmosphere, while at the same time they leave the body of the fire to work under the more economic steam-water-gas atmosphere, to maintain a high combustible content of the producer gas.

A Fine Ferro-Concrete Bridge.

In this issue are given three photographs of a splendid piece of constructional work which has been carried out over the railway line at the Willoughby Lane Works of the Tottenham District Light, Heat, and Power Company. For the photographs we have to thank Mr. H. C. Smith, Assoc M.Inst.C.E., Chief Engineer of the Company.

Price Reduction and Meter Reading.

The gas consumers in the enormous area of the Gas Light and Coke Company will rejoice. There is to be a reduction in the price of gas for the third quarter in succession, which will make it 0·4d. per therm below what it was before the coal stoppage. Since the end of March, the Company have gradually brought down their charge by 2·6d. per therm (1s. 1d. per 1000 c.ft.), which is calculated to represent upwards of 2·5 millions sterling on a year's sale of gas in their area. Of course, it is not claimed that this is a reduction from any normal figure, because during the six months preceding the end of March gas prices were abnormal; but that the Company are going to supply at nearly ½d. per therm below the charge ruling at the time the miners ceased work in 1926 is a matter for gratification. By the way, the "Daily Express," which took a large part in the gas-price agitation at the beginning of this year, on Tuesday of last week explained, by the aid of a drawing of a set of meter dials, how gas consumers can read their meters. Why not generally publish similar information? It would make an excellent newspaper advertisement.

Company Law.

Some members of the legal fraternity are not viewing in the most friendly spirit the Companies' Bill which has been introduced into Parliament, although it seems to us that, if their criticisms of it have good foundation, they should be able to look forward to a good harvest of work when the Bill becomes law. In a paper before the Law Society last week, Mr. Charles L. Nordon dealt with the proposed new legislation; and he expressed the view that, when the measure becomes law, a director will be surrounded by pitfalls in every direction. In order to escape them, he will more than ever have to appreciate not only that "honesty is the best policy," but he must attain to a far higher standard of industry and vigilance than was expected of the "guinea-pig" director. We do not know why a high standard of industry and vigilance should be regarded as a pitfall; it is a duty. In Mr. Nordon's opinion, the time seems ripe for a reconsideration of the whole system under which the administration of companies' affairs is committed to boards of directors. He also suggested that there might be better service by managers acting under the supervision of a shareholders' committee.

Future Price of Oil.

In the oil industry there is no great happiness over the present internal position of affairs. Over-production in America has had a large part in producing waste and altering the economic conditions. One authority considers that the oil-fields are being depleted far too rapidly, and that the effect of this must be to hurry forward the time when a shortage will be experienced, and prices will have to ascend. "The Petroleum Times" states that Mr. W. J. A. M. van der Gracht, a geologist and petroleum expert, of Los Angeles, is of opinion that the price of gasolene and lubricating oils will be doubled within ten years.

Taxation Burdens.

In industrial and commercial circles, a great deal of attention has of late been given to the question of the effect of heavy taxes and rates upon the prosperity of the country. Last Thursday, the matter was raised at a meeting of the Association of British Chambers of Commerce in Liverpool, and at that of the Society of Incorporated Accountants and Auditors at Manchester. At the former, the President (Mr. Gilbert C. Vyle, of Birmingham), although not pessimistic, expressed his dissatisfaction with the general current trade of the country. The promise of the year has not been fulfilled; and, in his view, we are so heavily waterlogged by crushing taxation that we have lost our buoyancy. It is in the reduction of our colossal expenditure that Mr. Vyle sees our only

hope of reasonable and bearable taxation. On the same occasion, a resolution was passed asking the Government to abstain from placing on the Statute Book any further measures which involve additional or local expenditure, to cut down the present high cost of the national service, and urging the Government and local authorities to exercise the most rigid economy in every direction. The Presidential Address of Mr. Thomas Keens to the Society of Accountants and Auditors gave the instructive information that the expenditure per head of population in this country has risen from £4 6s. 5d. in 1913-14 to £18 12s. 6d. in 1926-27. On the revenue side, the total was approximately 200 million sterling in 1913-14, and 805·7 millions in 1926-27. Of the latter amount about half is raised by direct taxation. Mr. Keens would be the last to deny that much of this enormous increase is justified by reason of our internal and external national obligations; but he is sure that, from the point of view of business men, manufacturers, and citizens, a good deal more can be said for its drastic reduction.

"T.U.C." President and a New Spirit.

The new President of the Trade Union Congress is Mr. Ben Turner, who is also President of the National Union of Textile Workers. He is a veteran in the trade union movement; and, at the recent Edinburgh Congress, he made a strong appeal for industrial conciliation, instead of strife. On that occasion he said: "I want to see a new spirit; a spirit on which we can rely among the people as a whole—among employers, commercial people, and all classes—which will assist as a means of leading people towards sober, steady, upright, and successful lives. I want a new spirit industrially." At the meeting of the Association of British Chambers of Commerce last week, the President (Mr. Gilbert C. Vyle) remarked hopefully upon the recent declarations of prominent trade union officials in favour of co-operation between workers and employers in a common endeavour to improve the efficiency of industry, and to raise the standard of life for the workers.

Miners' Wages and a Serious Problem.

It is reported that the deficits of wage ascertainments under the agreements entered into last year in the mining industry now exceed £7,000,000. This enormous sum stands as a charge against future wage percentages whenever they may rise above the minima guaranteed in the various district agreements. This, of course, is not a trading loss; it is the difference between the guaranteed minimum wage rate and the rate justified on the economic returns of the industry. Officials of the Miners' Federation state that it simply cannot be paid back.

Trade Union Political Funds.

The "contracting-in" principle in respect of trade union political funds, as established by the Trade Disputes Act, is causing serious consternation in the Labour party, with the result that a strenuous campaign is proceeding for the preservation of the funds. In connection with the distribution of new declaration forms for contracting-in, the members of all the large organizations are being implored to contract-in, in order that funds may be available for financing candidates at the next General Election. Those who are aware of what is happening inside the trade unions state that the new liberty of members in this particular has already made a conspicuous difference; and there is no enthusiastic response to the appeal for 100 p.ct. allegiance to the political fund. Members of the Miners' Federation particularly are seriously questioning the supposed advantage of political activity. Looking over the events of recent years, they find that political activity and their own interests have not been good companions. Of course, the political party are dangling the bait of wonderful things happening to the workers of the country if adequate monetary support is given to political purposes. The new covenant, it is stated, is going out in hundreds of thousands, and the recipients are urged to sign it. It reads: "I hereby give notice that I am willing, and agree, to contribute to the political fund."

PERSONAL.

Mr. SAMUEL HALL, Manager of the Builth Wells Gas-Works, has been appointed Gas and Water Engineer to the Milford Haven Urban District Council.

The Directors of the Croydon Gas Company have elected Mr. GUY SAVORY, of 16, Chichester Road, Croydon, as a Director, to fill the vacancy caused by the resignation of Mr. W. J. RUSSELL.

Mr. G. W. BROUGHTON, Technical Assistant to the Herne Bay Gas Company, has been appointed Assistant Manager to the Haslingden Union Gas Company.

OBITUARY.

All his friends will be sorry to hear of the death of Mr. ALFRED CARPENTER, who had represented Messrs. Wilsons & Mathiesons, Ltd., for over 30 years. Deepest sympathy is extended to his wife and family.

We are sorry to learn that the death occurred on Sept. 21 of Mrs. Baker, wife of Mr. HAROLD BAKER, who was for many years Engineer and Secretary of the High Wycombe Gas Company.

We are sorry to have news of the death, which occurred quite recently, of Mr. F. W. CLARK, who was in partnership for about four years with Dr. M. W. Travers, F.R.S., engaged in building glass melting furnaces, and in developing their system for the complete gasification of coal, under the name of Travers & Clark, Ltd. A year ago Dr. Travers retired from the firm, as he wished to confine himself to consulting work; but he and the late Mr. Clark continued to be closely associated, particularly in connection with the work of complete gasification, in which they were jointly associated with the Sturtevant Engineering Company, Ltd. In connection with the work of Travers & Clark, Ltd., then Mr. Clark's own business, he frequently consulted Dr. Travers, and both freely exchanged ideas on the subject of his work in connection with the manufacture of water gas. Mr. Clark had one large contract well in hand, and a quantity of minor work of a satisfactory character; and he was doing very well. He was a man with a keen and imaginative mind, balanced by experience and knowledge of the responsibilities of those who have actual charge of gas-works. His ideas upon complete gasification were not merely those of the inventor; and in discussion he would always in the end turn from scientific and technical considerations to view the matter from the standpoint of the gas-works manager. These qualities would have enabled him to make a great name for himself in the gas industry. His pleasing personality made for him many friends in the industry. Unfortunately he would deal himself with every detail, technical or otherwise; and long years of overwork resulted in a sudden and unexpected breakdown.

Counting Pipe in a Pile.

In a "Wrinkle" published in the "American Gas Journal," Mr. G. Goodwin, of New York, says he knows of an instance in which two engineers attempted to count the lengths of pipe in a certain pile in the storage yard. They resorted to the use of chalk for marking the lengths as counted; but notwithstanding that considerable care was exercised, their respective counts varied greatly, even on a re-check. In using chalk, the difficulty is somewhat obvious, when one considers that pipe in a pile will vary in length, and will be staggered. The suggestion is made that, when counting a pile of pipe, a number of ordinary building laths be used. As each pipe is noted, a lath can be introduced into it, with sufficient overhang to be readily discernible. Assume, with such a procedure, that a man counting the lengths has a pile of 300 laths. Then, as he counts the pipe, he introduces a lath into each length; and if he has three laths left at the end of the operation, there are obviously 297 lengths in the pile.

Gas for a Football Club.

The Directors of the Bournemouth and Boscombe Football Club, Ltd., have chosen gas for heating and lighting the various rooms, and for supplying hot water to the baths. The Bournemouth Gas and Water Company have, says the "Co-Partner" magazine, carried out the whole of the work in connection with the gas and water supplies. There is an installation of six "Victor" gas boilers for heating 400 gallons of water for the two plunge baths in the players' dressing rooms, and a coil of pipes in the drying room. By means of the six boilers, the whole of the 400 gallons of water can be heated in less than two hours, at quite a moderate gas consumption. The boilers are controlled by means of thermostats; and the 200-gallon cylinders have cut-out valves, so that when lesser quantities of hot water are required waste will be avoided. In the refreshment rooms, automatic gas boilers have been fitted for providing boiling water for tea making, &c. The warming of the various rooms is by means of thirteen gas-heated radiators

FORTHCOMING ENGAGEMENTS.

Oct. 8.—WESTERN JUNIOR GAS ASSOCIATION.—Meeting. Address by Dr. M. W. Travers, F.R.S.

Oct. 8.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Cardiff. Visit to the Grangetown Works of the Cardiff Gas Light and Coke Company.

Oct. 11.—INSTITUTION OF HEATING AND VENTILATING ENGINEERS.—Meeting in the Caxton Hall, Westminster, at 7 o'clock. Paper by Dr. J. S. Owens, M.D., Assoc.M.Inst.C.E., on "Atmospheric Pollution."

Oct. 14.—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.—Autumn meeting at Newcastle-upon-Tyne.

Oct. 15.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the Linacre Gas-Works, Liverpool. Presidential Address of Mr. F. B. Small.

Oct. 15.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Meeting at Edinburgh. Paper by Dr. Harold Hartley.

Oct. 27.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Autumn general meeting. Grand Hotel, Birmingham, at 2.30.

Nov. 5.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Joint meeting with the Western District at Glasgow.

Nov. 5.—WESTERN JUNIOR GAS ASSOCIATION.—Meeting. Papers by Mr. J. Malsbury, B.Sc., of Weston-super-Mare.

Nov. 16.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—General meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15.

Nov. 17.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn general meeting at the Hotel Cecil.

INSTITUTION OF GAS ENGINEERS.

Oct. 10.—Emergency Committee.

Oct. 10.—Finance Committee.

Oct. 11.—Education Committee.

Nov. 15.—Public Works, Roads, and Transport Congress. Morning—Joint Session with Incorporated Municipal Electrical Association for discussion on "Street Lighting." Afternoon—Institution Session for discussion of "How the Gas Industry can Assist Smoke Abatement."

ELECTRICITY SUPPLY MEMORANDA.

WE have only to wait long enough, and science will win, even among the most hardened sinners against it. Our friend "Meteor" of the "Electrical Times" is one of them. We remember the time when he used to call gas coke all the unkind names he could bring to mind, which it was permissible to publish. We forget the exact expressions used, but rubbish and leavings of the gas industry fairly instance what he said. That coke is in the main pure carbon, that even its breeze mixed with slack makes a fine incandescent fuel bed, and that in powdered form it is superior to powdered coal were facts which did not appeal to him. Coke was something produced by the gas industry, and that was enough; and, in his view, electricity generating stations ought to have nothing to do with it. But his unfriendliness has not stopped electrical engineers from reaping the advantages of improved boiler duty and economy. Speaking of the Institute of Fuel in his penultimate issue for September, "Meteor" remarks: "The appalling difference between the potential energy in a pound of the fuel known as coal, and the average energy utilized is a standing reproach to an age which prides itself on scientific progress and efficiency. Much of the fuel the world uses is not really used; it is extravagantly destroyed, and what is usefully employed is merely a bye-product of the destruction. There is probably no field in which greater material savings are possible, with concomitant advantages in health, comfort, convenience, and cleanliness, than that of fuel utilization." This looks like a real conversion. It is good to see "Meteor" bemoaning the loss of so much of the potential energy of coal through its bad utilization, and to learn how much he deplores its extravagant destruction. Perhaps the most extravagant user of all is the industry which can put from its very best stations, without deducting distribution losses, only about 18 or 19 p.ct. of the thermal energy of coal into transmission. In this respect, it takes its stand in the lowest grade of users. Even the household grate can do better with a 24 to 25 p.ct. efficiency. The fact of the matter is, to obtain from coal the highest amount of its valuable contents—thermal and otherwise—it must be carbonized, and the solid and gaseous elements be used for purposes for which heat is required. We are pleased to see "Meteor's" approval of the work that is being done to produce a greater co-ordination of fuel use, and therefore national economy. Anyway our friend thinks it better to fall into step with the rest of the world in this matter; it is preferable to "slating" a fuel of the virtues of which he knows little, but through the Institute of Fuel may before long hear much.

A Conversion.

We are a little doubtful as to what "E.D.A." thinks about a movement of the Associated Municipal Electrical Engineers (Greater London Centre). Every winter, "E.D.A." holds conferences of men interested in electrical salesmanship. At the meetings there are papers and discussions; but some people consider that these are too general, and that there is need for getting closer to the kernel of things. Whether we ought to say there is a breaking-away from the "E.D.A." conferences on account of their insufficiency of purpose, or whether what is being done is supplementary to them, we do not know. But there is the fact that the Associated Municipal Electrical Engineers of Greater London have formed a Sub-Committee with the object of organizing meetings of sales representatives in and around London. The idea sprang from the active brain of Mr. F. W. Purse, of West Ham; and the Committee which has resulted has Mr. A. C. Bostel, of Hackney, as Chairman, and Mr. Wooler, of Beckenham, as Hon. Secretary. The meetings are to be held in the showrooms or offices of the electricity supply undertakings. The fervent hope is expressed that this is only the modest beginning of collaboration on a large scale between the electrical experts in salesmanship. The view is that electrical salesmen, meeting by themselves after the manner of gas salesmen, will get down from the general to the particular, and that the result will be larger benefit to themselves and their undertakings. The salesmen of the rival industry regard themselves as its electric hares; our salesmen may be described as the greyhounds. The greyhounds are alive; the electric hares, mechanical.

Electric Salesmen Collaborating.

There has been much discussion lately regarding industrial combinations. To them some amount of antagonism has been shown which the facts of considerable experience do not justify. At the recent meeting of the Institution of Public Lighting Engineers, Mr. Arthur M. Paddon, Chairman of the Brighton and Hove Gas Company, pointed to some of the drawbacks of unrestricted competition, which, instead of reducing costs (as theory will have it should), has a tendency to waste, and so increase costs, which must be included in the price charged to the consumer. It is only up to a certain point that competition puts a restraining hand on the prices of any commodity; naturally the greater the competition and the number of competitors, the greater must be the aggregate of overhead charges which has to be found by the consumer. The "B.E.A.M.A." have lately issued a special publication on "The Electricity Industry and the Consumer," in which they deal with this particular question. It is held that, by all the tests generally advanced in favour of combination and scientific co-operation, the British electrical industry has been entirely justified in the policy it adopted immediately on the conclusion of the war. Its achievements since 1920 are illustrated by statistics which, it is submitted, constitute one of the strongest cases yet put forward for the adoption of the principle of combination. From the figures we extract the following: In respect of the average selling price of electrical goods, taking the index figure as 100 for 1920, it has been reduced to 51 in 1927. In respect of wages, the reduction in the same years has been from 100 to 87. Power plant efficiency has been increased from 100 in 1920 to 130 in 1925 (the figures are not available for the past two years, probably owing to the miners' strike). The average selling price of generating plant has been reduced from 100 in 1920 to 45·8 in 1927. The average selling price per unit of electricity has fallen from 100 to 70 in 1926 (65·5 in 1925). The prices of electrical machinery have declined to a very considerable extent from the 100 index figure in 1920. Turbines, for example, show a reduction to 40, turbo-alternators to 50, condensing plant to 30, rotary converters to 52·9, generators to 37, dynamos and motors to 40, switchgear to 64·8, transformers to 58, accessories to 65, and meters and instruments to 34·6. From these figures it is clear that the electrical industry has been able to improve its competitive position enormously since 1920; and it is claimed that this has been accomplished through the gradual elimination of uneconomic conditions of manufacture, and careful attention to works' costing, with the avoidance of waste and excessive overhead expenditure. This is one of the most important advantages resulting from large-scale production and co-operation; and, viewing the index figures already quoted, there can be no question that the consumer has benefited consistently from the policy adopted in the home market. It is submitted, however, that the examination of some of the figures, such as wages, proves that the prices charged in the industry at the

Improved Economic State of the Industry.

moment are distinctly lower than the conditions really justify. While the average wage paid per hour is now 87 p.ct. of that of 1920, the average price realized by the manufacturer for his products is only 51 p.ct., instead of which an economic price at the moment should be about 65 p.ct. of the 1920 average. It is considered that the general efficiency of the industry has been improved by upwards of 25 p.ct. since 1920. We do not want to detract from the significance of the quoted figures; but it must not be forgotten that in 1920 everything was at an abnormally high price, owing to *post*-war conditions.

Lowest Price Basis Reached.

The memorandum also rebuts the statement which has often been made that one of the causes of high prices of electricity in this country is the heavy capital cost of generating plant. The manufacturers maintain that a comparison of developments since 1920 discloses that, while the price of electricity is now 70 p.ct. of 1920, the capital cost of generating plant is only 46 p.ct. In addition, there should be taken into consideration the remarkable improvements in efficiency, and the great economies realized by generating plant of British manufacture during the last seven years. The coal consumption per unit generated in the power stations of Britain has been reduced by more than 30 p.ct. In other words, the profit-earning capacity of the generating plant has improved by 30 p.ct., with a consequent real reduction in capital cost. Allowing for this factor alone, the actual cost of generating plant is now not more than 30 p.ct. of that ruling in 1920. It does not, however, appear that the industry can look for any further great improvement in this direction. It is, in fact, deliberately stated in the memorandum that: "The inevitable conclusion is that industry has now reached its lowest price basis. During five years, through persistent reorganization and improvements in methods of production, it has been able to make good reductions in price which, without these measures, would have proved disastrous. The industry has been able to maintain and actually improve its competitive efficiency without sacrificing the interests either of the consumer or of labour." Notwithstanding the claims of the memorandum, complaints continue to be made of the higher cost of British electrical plant compared with the foreign products; yet the export returns show that British makers are securing a very fair share of the work abroad.

Mishaps.

John Loughran, age 31, recently met his death by electrocution at Messrs. Bolckow, Vaughan, & Co.'s Eston Steelworks, Middlesbrough. It appears that he was using an iron bar which touched an overhead lighting cable. This was 8 ft. above the ground; but it was found that a small section of the insulating covering had worn away, and the bar chanced to strike this unprotected part. The voltage was 230. At the inquest, it was shown that, at the time of the accident, Loughran was standing in a pool of water in heavy rain, and the bar was also wet, which conditions allowed the current to pass directly through his body, causing instant death. In returning a verdict of "Accidentally electrocuted," the jury, in view of a statement that it was impossible to examine the lighting system periodically for insulation defects, recommended that the lighting cables should be protected by a stronger covering of metal. It was promised that this should be done. A Manchester paper reports that, due it is believed to the fusing of electric wires, a fire occurred on Sept. 26 at the Springfield Engineering Works, Patricroft, owned by Messrs. Archibald Edmeston & Sons, Ltd. The sparks fired a number of bales of cotton on the ground floor, and the Eccles Fire Brigade were engaged for an hour and a half before they were able to subdue the outbreak. From Germany comes the news that the worst fire in central Berlin for years occurred on Sept. 25, when the sales building of the Allgemeine Electricitats Gesellschaft was gutted. The loss amounts to millions of marks. The report states that a portion of the city was plunged into darkness; and the work of the firemen was most dangerous owing to the electrification of the water. The evening papers for Sept. 24 reported that, early that day, a fire occurred at a house in the Crowstone Road, Westcliffe. In one of the bedrooms, an elderly couple, Mr. and Mrs. Childs, were found asleep; and it was necessary to carry the former out of the house. The fire, which caused considerable damage, is said to have originated through an electric heater. On Sept. 27, fire broke out in an electric box opposite the Royal Exchange, Manchester. A sheet of flame shot up from the pavement, a patch of the street (about 4 ft. in diameter) was blown out, shop windows were cracked, and the street was thrown into darkness.

THE SOUTHAMPTON CONFERENCE OF THE "B.C.G.A."

ON BOARD R.M.S. "MAJESTIC."

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

HALF-YEARLY MEETING AT CAMBRIDGE.

A promise made to the President of the Association (Mr. Frank Prentice, Engineer and Manager to the Ipswich Gas Light Company) by Mr. J. W. Auchterlonie, that he would endeavour to arrange an autumn meeting this year at Cambridge, was nobly fulfilled last Friday, when a big gathering of members—much favoured, for the day was gloriously fine—were the guests of the Cambridge University and Town Gas Light Company, whose esteemed Engineer and Manager, of course, Mr. Auchterlonie is. The day was one of complete enjoyment, and will live long in the memories of those who were privileged to take part in the proceedings. Much care had been bestowed upon the arrangements; and success was the reward of Mr. Auchterlonie and his Directors.

Seventeen years had elapsed since the last visit of the Association to Cambridge, which took place in the autumn of 1910; and seventeen years is a substantial period in the life of a progressive undertaking. Therefore it was to be expected that those members who had joined in the previous visit would find that many changes had been brought about in the meantime. In this, they were not disappointed. Since 1910 both the yearly make of gas and the maximum daily output have more than doubled; and this fact has of necessity compelled alterations and additions to the plant.

The place of meeting was the gas-works; and here the members were cordially welcomed by the Chairman of the Company (Dr. E. H. Parker), other Directors, and Mr. Auchterlonie. They were able to see for themselves how the works have been improved and brought up to date; and later in the day, at the business meeting, Mr. Auchterlonie presented a profusely illustrated paper, in which he gave a brief description of some of the main alterations and additions that have been made. At the works Mr. Auchterlonie had ready help in imparting information to the visitors from his assistants (Messrs. Thomas and Winch), the draughtsmen (Messrs. Barton and Bourne), and the foreman (Mr. Bowman).

INAUGURATION OF A 3 MILLION C.FT. HOLDER.

Following individual inspection of various parts of the works, there was, at mid-day, a general assembly close to a new gas-holder, which it had been arranged that the Chairman should then inaugurate. In order to take full advantage of the ground space available, it was decided that the holder should have a capacity of 3 million c.ft., with a tank 190 ft. in diameter. Trial holes were sunk to determine the nature of the ground; and this was found to be suitable for the tank to be constructed of concrete. Owing to the site chosen for the new holder being at a higher level than the ground sloping down towards the riverside, it was necessary to build a retaining and boundary wall before the excavation for the concrete tank could be made. The wall was constructed in concrete; and is approximately 412 ft. long and 11 ft. high from the road level. The concrete tank was built by Messrs. Robinson & Co., of London. The contractors for the three-lift guide-framed holder were Messrs. C. & W. Walker, Ltd., of Donnington. Particular attention has been given to the design of the guide framing, to prevent as far as possible any pockets being formed which would hold water or be inaccessible for painting, and so tend to cause corrosion.

The Chairman, cutting a ribbon which permitted of the opening of the valve to turn-on gas from the holder to the town, said it gave him great pleasure to inaugurate this holder, which represented the biggest thing they had ever done at the Cambridge Gas-Works. Since 1910 the works had been vastly improved; and he hoped and believed the visitors would now find them model works in every respect.

Mr. R. J. Milbourne (Managing Director of Messrs. C. & W. Walker, Ltd.), on behalf of the two firms of contractors responsible for the erection of the holder, asked Dr. Parker to accept a silver bowl as a small memento of the occasion. He congratulated the Gas Company and their Engineer upon the completion of such a fine piece of work. He had no hesitation in saying that the standard guide-framed holder was one of the safest and most reliable types that any engineer could adopt. The Company could confidently look to the holder to give them very many years of successful service. He congratulated the Engineer upon the skill and ability with which he had designed the work and carried it through to completion.

Mr. R. Robinson (Managing Director of Messrs. R. Robinson & Co.) said it was a great pleasure to be present at the inauguration of the holder. His firm had received great assistance in their work; and he desired specially to acknowledge the courtesy and fairness of the Engineer.

The Chairman said the rose bowl would always remind him of a happy occasion; and he thanked the two firms for the kindly thought which had prompted its bestowal. He was sure the work had been well done, and that it would last for a great number of years. They had to remember that the man primarily responsible for all that was to be seen there was their Engineer and Manager, Mr. Auchterlonie. [Applause.]

LUNCHEON.

Conveyances were in waiting to take the visitors to the University Arms Hotel, where, on the invitation of the Chairman and Directors of the Cambridge University and Town Gas Light Company, a party of over 130 sat down to luncheon. Dr. E. H. Parker, M.A., J.P., D.L., was in the chair; and he was supported by Col. C. T. Heycock, M.A., D.L., F.R.S., Mr. G. P. Hawkins, M.A., J.P., and Mr. F. J. Dykes, M.A. (Directors), Mr. Auchterlonie, and the Secretary (Mr. A. E. King). Those present included the Mayor of Cambridge (Alderman Conder), Mr. Frank Prentice (the President of the Association), Mr. Henry Woodall, Mr. Walter Dunn (the Secretary of the Institution of Gas Engineers), Mr. W. M. Mason (the Manager of the "B.C.G.A."), the Chairman of the Ely Gas Company, the Chairman of the Brightlingsea Gas Company, Mr. R. J. Milbourne, and Mr. R. Robinson.

The Loyal Toast having been honoured,

Time's Changes.

The Chairman said he rose on behalf of the Gas Company to welcome the members of the Association to Cambridge. In 1910 he had enjoyed the same privilege; and he was glad to see again that day some of the faces that he had seen then. Among these, he might mention Mr. Prentice (their President), Mr. Thomas Glover, of Norwich, and Mr. Auchterlonie, who was the President of that year. There had been great strides in the gas industry since 1910. Labour-saving machinery had almost entirely taken the place of manual labour—and a very good thing too. But perhaps the greatest development that had taken place in the gas industry was in the appliances used for the consumption of gas. There was no doubt that much of the prosperity of the gas undertakings was due to the efficiency of the cookers, fires, and other apparatus of a like character. One change which had been greatly to the benefit of everybody was that from the illuminating power to the calorific value standard. They had all learned a great deal in the years that had intervened between 1910 and now, and one thing was how to pilot an undertaking through strikes. There had been coal strikes, railway strikes, and a general strike; and in Cambridge, to keep their hands in, they had had a little domestic strike of their own, when some of the gas managers present had been kind enough to help them. In 1910 the output of gas in Cambridge was 402 million c.ft.; while for the twelve months ended June last the make was more than twice as much.

Amicable Relations.

It was a pleasure to welcome the Mayor of Cambridge (Alderman Conder), who was just about to complete a very successful year of office. The Corporation were the watchdogs of the Gas Company; but so far as his experience went—and it extended over nearly thirty years—they had never had any disputes or unpleasantness of any kind with the town. On the contrary, they had always found the Corporation most willing to help them in any way. The Corporation had never found much fault with the Company. Though they were the watchdogs, he had never heard them bark. Indeed, he did not think he had so much as heard them growl. The Mayor had kindly promised to bring the members of the Corporation to visit the works which those present had just been inspecting; and he was sure all would agree that they were works well worth seeing. ["Hear, hear."] He hoped the Corporation had been satisfied with the efforts of the Gas Company during the difficult times of last year. The supply of gas had been maintained; but unfortunately, owing to the amount spent on importing foreign coal, it was necessary to increase the price of gas from 9d. to 10d. per therm. This figure had had to remain until March last, when they were able to reduce the price to the pre-strike one of 9d. From the June readings, a further reduction to 8d. had been made; so he thought their record was not a bad one. Their relations with the Electric Light Company were also friendly; and they had never had to complain of unfair competition. He had nothing to say against electricity; but he had something to say against the way in which the Government boosted electricity during the passage of the Electricity Supply Bill. He did not think this was fair to the gas industry, whose great services to the country appeared to have been altogether forgotten. On the occasion of the previous visit of the Association to Cambridge in 1910, he read in the "Gas Journal" a reference to the mutual confidence and reliance that existed between the Directors of the Gas Company and their Engineer, Mr. Auchterlonie. Well, he would like to say, on behalf of himself and his co-Directors, that this mutual confidence and reliance still existed. [Applause.] The members had seen the works, which testified to the ability and painstaking care of Mr. Auchterlonie. The toast he had to submit was that of "The Eastern Counties Gas Managers' Association."

A Well-Managed Company.

Mr. Frank Prentice remarked that, as President of the Association, it was his pleasant duty to respond to the toast. The Gas Company had extended to them a hearty welcome and generous hospitality, and had permitted them to see a beautiful works. For all this they were grateful. He felt also under a personal debt of gratitude to the Cambridge Gas Company; for on a certain occasion not long ago, when they were in the throes of the coal strike, and Ipswich was in a difficult position, he communicated with Mr. Auchterlonie, whose

Company kindly allowed him to have a quantity of coal to enable him to carry on. They always looked with envious eyes on the Cambridge Gas Company, which was managed extremely well. The Company's results spoke for themselves, and proved beyond doubt that there was a very enlightened Board to back-up their friend and colleague, Mr. Auchterlonie.

PERFECT CONDITION AND CONTINUITY OF CONTROL.

Mr. HENRY WOODALL, proposing "The Cambridge University and Town Gas Light Compnay," said it was a great pleasure to him to be present that day. They had been round a beautiful works, and had admired them very much indeed; and they had also been present at the inauguration of the largest gasholder in the district. On the previous day he had had the pleasure of inaugurating a holder at Ipswich, which at that moment was the largest in the district; but he had only enjoyed the satisfaction for 24 hours of having inaugurated the largest holder in the district. [Laughter.] Everything in the Cambridge Gas-Works, they had noticed during their visit, was done in the way they would like to see their own works conducted. One realized, perhaps, why this Company were able to sell gas at a cheaper rate than any of them. With works maintained in this perfect condition, the wear and tear was very small, each man could do his work in the best way, and one did get the highest possible results. One other reason for the excellent results of this Company was continuity of control. The Company had had the benefit of Dr. Parker as Chairman for something like 30 years; and for the same time he had been associated with their friend Mr. Auchterlonie. Those who knew these gentlemen would see in this fact strong reason for success. It was a great pleasure to wish the greatest possible prosperity to a Company that had so extraordinarily well earned it. [Applause.]

The CHAIRMAN thanked Mr. Woodall for the kind things he had said about the Gas Company and their Engineer—things which were all the more appreciated, because they knew the value of Mr. Woodall's opinion. He also thanked Mr. Prentice for his remarks. The Company had always enjoyed the advantage of being able to get people with technical knowledge to join the Board. In fact, he did not think they had had to employ any professional engineer or chemist outside their own body since he had been connected with the Company.

BUSINESS MEETING.

By permission of the Mayor, the business meeting was held in the Council Chamber of the Guildhall—Mr. FRANK PRENTICE (the President) in the chair.

CONFIRMATION OF MINUTES.

The PRESIDENT said the first item on the agenda was the confirmation of the minutes of the last meeting. These had been published in the Technical Press, and in accordance with custom would be taken as read. He moved their confirmation; and it was agreed to.

EDUCATION SCHEME.

The HON. SECRETARY (Mr. W. H. Mainwaring, of Lincoln) said he had received letters of regret from several gentlemen, including Mr. John Wilkinson, who had been prevented by a Committee meeting from attending. He had also received a letter from Mr. Dunn, with regard to the Education Scheme of the Institution of Gas Engineers, which contained the following:

> The conference of the Gas Education Committee with the representatives appointed to serve on the District Education Committees took place yesterday [July 26], when the expression of the regret of the Eastern Counties Gas Managers' Association at not having been able to nominate representatives to attend was communicated. I may say that the Board of Education have appointed Mr. J. O. Peet, of Ashbourne House, Spring Hill, Lincoln, to serve on your District Committee as its representative.
>
> It is hoped that your Committee at their meeting to be held at an early date will appoint the four representatives of your Association, in addition to the four representatives who may be regarded as specially identified with the interests of the Juniors—making eight altogether.

The PRESIDENT suggested that they should appoint a Committee to go into the subject of education—to consist of the President, the Hon. Secretary, and the two senior members of the Committee (Messrs. E. W. Smith and A. Gregory).

This having been agreed to,

Mr. WALTER DUNN (Secretary of the Institution of Gas Engineers) said he hoped the Association would appoint one of their number to be present at the next meeting of the main Committee. It was desired that every District Committee should be represented on that occasion.

The PRESIDENT said the Hon. Secretary would take notice of this.

NEW MEMBERS.

The PRESIDENT, proposing that the following new members be elected, said the list had been considered by the Committee:

Members.

Mr. Frank Hargreaves, Manager, Long Sutton Gas Company. Mr. C. G. Coote, Manager, Wickham Market Gas Company. Mr. Jos. Green, Manager, Market Rasen Gas Company. Mr. T. V. Johns, Assistant Manager, Lowestoft Gas and Water Company. Mr. W. J. C. Garrard, Assistant and Chief Chemist, Ipswich Gas Company.

Associate Members.

Mr. R. J. Milbourne, Managing Director, Messrs. C. & W. Walker, Ltd., Donnington. Mr. J. L. Butler, Managing Director, Messrs. W. J. Jenkins & Co., Ltd., Retford. Mr. A. E. Plumstead, Welding Engineer, Norwich.

Mr. J. H. TROUGHTON (Newmarket), in seconding the proposition—which was agreed to—invited those of the new members who were eligible to become members of the Commercial Section.

PAPERS READ.

Mr. J. W. AUCHTERLONIE then read his paper describing "Alterations at the Cambridge Gas-Works between the visits of the Eastern Counties Gas Managers' Association, 1910-1927." In concluding it, he expressed his indebtedness to his assistants for having supplied him with a good deal of information, and for the preparation of some of the drawings and photographs.

Lieut.-Col. W. CARMICHAEL PEEBLES, D.S.O., followed with "Some Notes on Automatic Governing and a Self-Loading Station Governor," which he illustrated with lantern slides.

Time was pressing, and discussion did not result from the reading of Mr. Auchterlonie's paper. One or two questions were asked and answered with regard to the governor described by Lieut.-Col. Peebles.

The papers will be found reproduced on other pages of this issue.

The PRESIDENT, proposing a vote of thanks to the authors for their extremely interesting and valuable papers, remarked that both of them had gone to a large amount of trouble in the preparation of their contributions.

Mr. J. B. HANSFORD (Bedford) seconded the vote, which was carried with acclamation, and acknowledged by the authors.

OFFICERS FOR 1928.

The PRESIDENT said the next thing was the election of officers, whose duties would extend from Jan. 1 to Dec. 31.

Mr. W. W. TOWNSEND (Colchester) proposed Mr. J. B. Hansford, of Bedford, as President for the ensuing year. He remembered meeting Mr. Hansford when he was at Barnet as Assistant, and had then been most struck with the arrangements for which he was responsible at those works. When the members visited the Bedford Gas-Works, he felt sure they would realize Mr. Hansford's ability as an engineer. His fertility of mind was shown by the fact that he had invented a process for making neutral sulphate of ammonia. He would uphold the prestige of the Association, and would shed quite a new light on some of their problems.

Mr. F. A. WEST (Newark) seconded the motion, which was heartily agreed to, and acknowledged by Mr. HANSFORD.

The PRESIDENT said he would propose as Vice-President Mr. H. C. Smith, Chief Engineer to the Tottenham District Light, Heat, and Power Company. One of the leading lights of the profession, Mr. Smith was Engineer of a works of a size that most of the members of that Association knew little or nothing about. They were fortunate in having him to fill a position which would automatically make him President in 1929.

Mr. TROUGHTON seconded the election, which was acknowledged by Mr. SMITH.

On the proposition of Mr. E. F. KEABLE (Gorleston), seconded by Mr. MAINWARING, the Auditors (Messrs. G. A. Mallett and W. S. Venner) were re-appointed.

Mr. P. D. WALMSLEY (Great Yarmouth) said he understood that Mr. Mainwaring was giving up the Secretaryship, which office he had ably filled for many years past. He did not think they could find a better successor as Secretary and Treasurer than Mr. E. F. Keable, who had the interests of the Association very much at heart. He moved Mr. Keable's appointment.

Mr. R. WARDELL (Peterborough) seconded the proposal, and endorsed all that the previous speaker had said.

The PRESIDENT remarked that, in putting this to the meeting, he would like to express the regret they all felt that Mr. Mainwaring, who had served them ably for so long a time, had thought it necessary to resign. They greatly appreciated his services; and it was intended to mark this appreciation at the spring meeting. In the matter of a successor, he did not think they could have made a better choice than Mr. Keable.

The resolution was agreed to.

PLACE OF NEXT MEETING.

Mr. HANSFORD said he trusted the members would honour him by coming to Bedford for their spring meeting. Within the last eight years the works had been practically pulled down and reconstructed.

The invitation was accepted with pleasure.

ROAD TAR REPRESENTATIVE.

Upon the recommendation of the Committee, Mr. Thomas Glover was appointed Road Tar Representative for next year.

For Those Who Have Fallen by the Way.

The President said there had been a strong feeling among some of them for many years past that better means might be found of helping those who had fallen by the way through no fault of their own, than by trying to collect money among themselves when the need arose. The formation of a fund in the Eastern Counties would enable them to dispense a little well-deserved assistance, after careful investigation. Now Mr. W. Jones had come forward with an offer to start such a fund with a donation of £50. It was not proposed to call upon the members for any additional subscription to supplement this amount; but the Committee had some hope of being able to suggest that a portion of the existing subscription should be devoted yearly to the purpose of building-up this fund. It was desired to have a scheme prepared to lay before the members at the spring meeting; and he suggested the appointment of a small Committee to draw-up such a scheme.

On the motion of Mr. Walmsley, seconded by Mr. F. M. Paternoster (Felixstowe), a Committee were appointed to deal with the matter.

The President remarked that when the Committee reported would be a suitable time to express their gratitude to Mr. Jones.

Later.

This brought the business to a close, and members were served with tea in the Guildhall.

Later they met again to dine together in the Lion Hotel, with the President in the chair. The Chairman and Directors of the Gas Company and other guests had been invited to be present. There were some interesting and amusing speeches.

Mr. T. Glover, in proposing "The Cambridge University and Town Gas Light Company," said he had been entrusted with the same toast in 1910; and the health of the Company had never failed since. [Laughter.] He paid a tribute to the progress made at Cambridge "by a living, enterprising, and active Gas Company," and remarked that it was one of the satisfactions of the Board of Directors and those who took a responsible part in the administration of gas undertakings to feel that they were connected with an industry that could show a high percentage of efficiency in dealing with that wonderful material they called coal. No gas company could survive and succeed unless it gave its best service to consumers.

Col. C. T. Heycock, replying, spoke of the remarkable changes that had taken place in the Cambridge Gas Company, and said he would be a bold man who would predict what would be seen in their gas-works when the Association meeting took place in Cambridge 50 or 60 years hence.

In a very amusing speech Mr. F. Prentice proposed "The Town and University of Cambridge"—"Cambridge the seat of the mighty, the home of learning, piety, and wit. Cambridge, which has the largest gasholder in the district. Cambridge, which has the largest exhauster. Cambridge, which possesses the one and only Auchterlonie." [Laughter and applause.]

The Mayor (Alderman Conder), responding, remarked that he had never heard a word of discontent about the Gas Company; it was regarded as enterprising and up to date.

Mr. G. P. Hawkins proposed "Success to the Eastern Counties Gas Managers' Association," and commended the objects for which it existed. He also paid a tribute to the work of Mr. Auchterlonie.

Responding, Mr. F. A. West said the Association had now been in existence about forty years, and he supposed had reached decent middle age. It had reached what was called in most lives the years of discretion, and, he ventured to say, had lived a useful life, and had helped to make the gas industry a little better than it was previously. It was a source of pride to them that they had such an outstanding man as Mr. Prentice as their President. Most of the credit in that case was due to Mr. Auchterlonie, who had persuaded him into office.

The toast of "The Visitors and Press" was submitted by Mr. W. W. Townsend, and responded to by Mr. W. M. Mason.

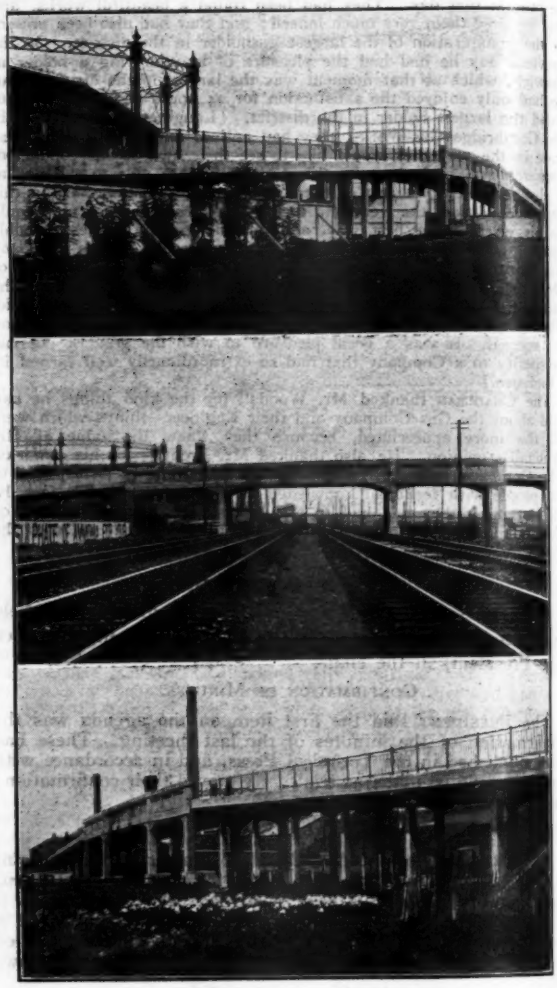
It was announced by Mr. Auchterlonie that on the following day golf could be played on the Gog Magog Links; while arrangements had also been made for a guide to take a party round the Colleges—still further evidence of that thoughtfulness which is so gratifying to guests.

Conference on Methods of Coal Analysis.—The British Engineering Standards Association announce the calling of a conference resulting from a request of the Committee of the Privy Council on Scientific and Industrial Research that British standard methods of coal analysis should be adopted. It is suggested that Report No. 7, "Methods of Analysis of Coal," as drawn up by the Fuel Research Board, should be used as a basis for the preparation of a British Standard Specification for national use. The conference is being called for the purpose of ascertaining if there is a consensus of opinion in favour of setting up a "B.E.S.A." Committee to deal with the subject; and delegates from all interested bodies have been invited to attend. The Committee of the Privy Council state that the question of methods of analysis is one of increasing importance, owing to the growing tendency to purchase coal to specification. This is especially so with foreign purchasers. They consider that the national adoption of standard methods of analysis would be of considerable advantage to both producers and users of coal.

A FINE FERRO-CONCRETE BRIDGE.

At the Willoughby Lane Gas-Works at Tottenham.

At our request, Mr. H. C. Smith, Assoc.M.Inst.C.E., Chief Engineer of the Tottenham District Light, Heat, and Power Company, kindly forwarded the photographs below of the fine ferro-concrete bridge which has recently been erected for his



Company, by Messrs. K. Holst & Co., 1, Victoria Street, S.W., over the L.N.E. Railway, at the southern end of the Willoughby Lane Works. The bridge connects the Company's property on the eastern and western sides of the railway.

"A Tragedy of the Law."

We have received from Mr. George Helps, of Nuneaton, a large quarto pamphlet bearing the above heading. It consists of notes and comments on his action against the Mayor, Aldermen, and Burgesses of the County Borough of Oldham, the trial of which lasted 25 days. The notes take the form of a letter to the heads of some 33 gas undertakings who signed what is called an "Agreement" in regard to Mr. Helps' inventions, which, he submits, are of great value not only to the gas industry but to the country at large. In the forefront of the pamphlet, Mr. Helps quotes what took place in Court on Nov. 1, when an application was made on his behalf for an extension of time for appealing against the judgment of Mr. Justice (now Lord Justice) Lawrence in the Chancery Division. It will be remembered that the application was refused. He also quotes another case on Nov. 29, in which application was made for leave to appeal, notwithstanding that the time-limit for entering an appeal had expired, and which was allowed. To the notes and comments there are a number of appendixes, the first of which is composed of a list of the companies who, it is stated, signed the "Helps' Agreement." The subsequent appendixes are quotations from numerous sources, all bearing upon Mr. Helps' schemes for the production of low-grade gas. The publication can be obtained from Mr. Helps, Manor Court, Nuneaton, at the price of 3s. 6d. net in paper covers, and 7s. 6d. net in stiff covers.

BOROUGH OF LANCASTER GAS DEPARTMENT.

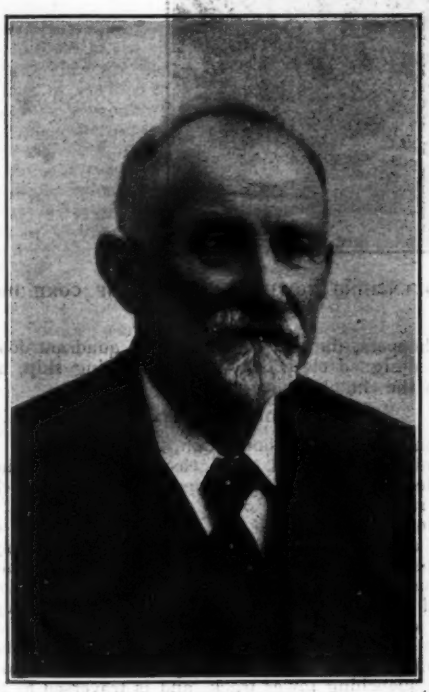
CENTENARY CELEBRATION.

Official Inspection of New Inclined Chamber Plant, Sept. 27, 1927.

An important addition was made to the plant at the Lancaster Corporation Gas-Works on Tuesday, Sept. 27, when Councillor THOMAS TILL, the Chairman of the Gas Committee, formally unveiled a tablet affixed to the chimney stack of the new inclined chamber ovens and washing plant, while Alderman I. J. CURWEN, the Mayor of Lancaster, by turning a valve, caused the gas which was being generated to be circulated for public use. Those present then inspected the plant.

HISTORICAL.

The Lancaster Gas Company came into being in 1826, and gas was first manufactured and supplied to the consumer in 1827—100 years ago. In 1879 the Company was taken over by the Lancaster Corporation; and the undertaking has continued, to date, to be successful and profit-making. During this period a sum of £74,200 has been contributed towards the relief of the rates in the borough. The total capital expended on the works to March, 1927, was £186,000, but the



Councillor THOS. TILL,
Chairman of Gas Committee.

net outstanding debt has been reduced to £77,350, equivalent to £218 per million c.ft. of gas made per annum.

The consumption of gas in the borough is largely domestic; only 10 p.ct. being supplied at the industrial rate. Domestic gas to-day is 2s. 9d. per 1000 c.ft., and the minimum rate for industrial gas is as low as 1s. 2d. per 1000 c.ft. No meter rents are charged.

DESCRIPTION OF WORKS.

The works are situated on St. George's Quay on the banks of the River Lune, and have access to both rail and river frontage. All coal is rail borne.

Carbonizing Plant.—There are 13 beds of horizontals, each of D section through 20-ft. retorts, carbonizing 10-cwt. charges per 12 hours. The retorts are operated by De Brouwer charging and discharging machines. This installation has a capacity of 1,400,000 c.ft. per day. The make of gas is 14,000 c.ft. per ton, having a calorific value of 475 B.Th.U. per c.ft. This retort house and coke plant are now being superseded by the inclined chambers, described later.

Carburetted Water Gas Plant.—This was supplied by Humphreys & Glasgow, Ltd., and has a capacity of 500,000 c.ft. per day.

Condensers.—After much consideration, Holmes' new "Super" water condensers have been adopted. The machine erected consists of one super-type horizontal tube water-cooled condenser of 2 million c.ft. per day capacity. There are 840 tubes, 2½ in. diameter by 8 ft. long, and a total cooling surface of 4398 super. feet. The water connections are arranged for three separate supplies, so that advantage may be taken in the future of alternatives other than town water.

Wet Purification.—The wet purification plant has all been renewed, and consists of a Livesey washer, a P. & A. tar extractor, and an 8-ft. diameter rotary brush ammonia washer—all of W. C. Holmes & Co.'s make, and of 2 million c.ft. per day capacity. There is also a rotary ammonia washer, made by R. & J. Dempster, Ltd., of 1 million c.ft. per day capacity.

Sulphate Plant.—The ammonia liquor is worked up in a Wilton 4-ton capacity sulphate of ammonia plant with enclosed saturator.

Tar Distillation Plant.—Tar is treated in two 16-ton pot stills for the manufacture of road tar, naphtha, light oils, creosote, anthracene, and pitch.

Gasholders.—The works are provided with two holders, having a combined capacity of 1,550,000 c.ft.

Control of District Pressures.—These are regulated by a 24-in. Braddock governor; the low-pressure mains being

GEO. DIXON, B.Eng., Assoc.M.Inst.C.E.
Engineer and Manager.

assisted at periods of high output by means of a belt of high-pressure mains; the two systems being interconnected through Reynold's district governors.

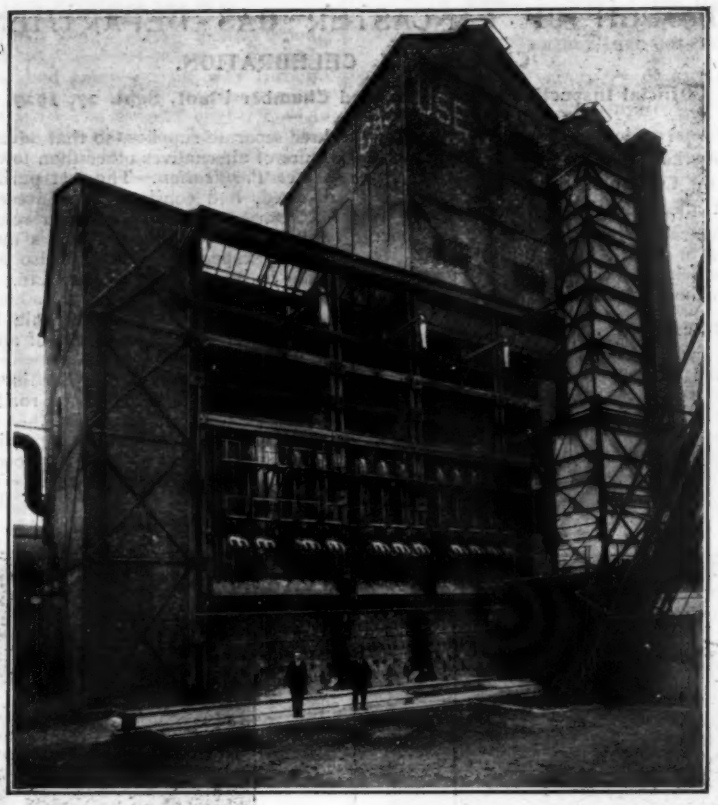
Distribution Department.—The showrooms, workshops, and distribution services are located at Market Square, in the centre of the town.

EXTENSIONS AND DEVELOPMENTS.

In 1923 the Gas Committee reported that the existing carbonizing plant—though giving excellent working results—was getting very costly to maintain, owing to its age, and that it would not meet the requirements of the borough after the 1925 winter season. War-time experience had created a great divergence of opinion among engineers as to the type of carbonizing plant likely to be adopted in the future; and a systematic investigation of all types then on the market was therefore undertaken, and developments were carefully watched for a period of two years, special consideration being given to local conditions of ground space, choice of fuels, and quality of coke.

The results of the Gas Department's investigations were tabulated under twelve headings: Capital cost; type of plant best suited to the available site; type of plant best suited for future extensions; plant with widest choice of fuels; quality of coke produced; quality of tar and other residuals made; labour costs and conditions; quantity of gas and residuals; maintenance costs; suitability of plant for manufacture of water gas; size of unit; and best type of plant to meet future tendencies in coal carbonization.

It was finally decided that the type of unit best suited to



NEW INCLINED CHAMBER HOUSE SHOWING DISCHARGING DOORS, QUENCHING TOWER, AND BASE OF COKE HOIST.

the locality was a small inclined chamber plant—something on the lines of what had been erected in Darwen some twelve years ago. Several modern plants were inspected and tested on the Continent; and as a result of this an order was placed with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., for an installation of inclined chambers built with British materials and by British labour.

NEW CARBONIZING PLANT.

This has been built by the Woodall-Duckham Company to designs obtained from the Stettiner Chamotte Fabrik A.G., who have been responsible for the construction of the major portion of the inclined chambers erected on the Continent. The Lancaster setting has been built by British labour with British materials all through. Over sixty plants of this type are working on the Continent.

Chamber Settings.

The new plant is designed to make per day over 2 million c.ft. of gas, having a calorific value of 475 B.Th.U. gross. The fifteen chambers each carbonize 9·2 tons of dry coal per 24 hours in two 12-hour charges of 4·6 tons each.

The installation comprises (*a*) two settings of four chambers; (*b*) one setting of three chambers, each setting being provided with two producers; and (*c*) two settings of two chambers, each of these last-mentioned settings being provided with one producer. All are arranged in one bench.

Straight joints are formed between adjacent settings, so that any one setting may be heated up or let down without interfering in any way with the others.

Coal Handling.

Coal is brought in railway wagons by an extension of the existing railway sidings, and there discharged by hand into a 15-ton receiving hopper placed at the ground-level; provision being made for the installation of an electrically-driven rotary wagon tipper at a later date.

From this receiving hopper, the coal is fed by means of a reciprocating feeder into a 35-tons per hour single roll breaker. The feeder is fitted with a screen for taking out the small coal, which passes through a by-pass chute directly into the delivery chute under the breaker. It is fitted with a flap door, so that when dealing with slack this can pass direct into the by-pass chute through the floor of the feeder without passing through the breaker.

The broken coal, together with the small coal by-passing the breaker, is fed into a 40-tons per hour gravity bucket conveyor of the over-lapping bucket type. This conveyor elevates the coal and discharges it into the overhead storage hoppers by means of three fixed dumpers and chutes. From the overhead storage hoppers, the coal is fed through quadrant doors into a specially designed electrically-driven charging skip, by means of which the chambers are charged.

Coke Handling.

On completion of carbonization, the discharging doors of the chambers are opened by an electrically-driven winch fitted on an electrically-driven coke quenching tower, which travels on steel rails laid in front of the bench at floor level. On the door being opened, the hot coke falls out of the chamber, through a steel hopper in the side of the quenching tower, into a specially designed skip having a capacity equivalent to the discharge from one chamber. In this skip the hot coke is quenched by an overhead spray passing a fixed but regulatable quantity of water. The smoke and steam rise up inside the tower and escape to atmosphere above the level of the roof of the chamber house. The coke skip runs on rails laid between the coke quenching tower track, and is traversed by the tower itself.

When the coke is quenched, the skip is taken to the centre of the bench, and there discharged into a reinforced concrete hopper, from which the coke is fed into the 10-cwt. skip of an electrically-driven automatic inclined hoist; the discharge of coke from the hopper being regulated by a sliding door operated by the skip itself. The coke is elevated in this skip, and automatically discharged into small receiving hopper placed above the outside coke screening and storage plant. From this hopper the coke passes on to a rotary grizzly screen which separates the coke into two sizes—all over 2 in. and all under 2 in. The larger coke passes directly into one compartment of the storage hoppers by means of a suitable chute.

The small coke passes to a series of "Cascade" screens, which separate it into three sizes: Breeze (below ⅜ in.); nuts (over ⅜ in. and under 1 in.); and cobbles (over 1 in. and under 2 in.). Each size falls into a separate compartment of the reinforced concrete storage hoppers, the total capacity of which is about 193 tons, equivalent to the approximate gross amount of coke produced in 48 hours from the fifteen chambers.

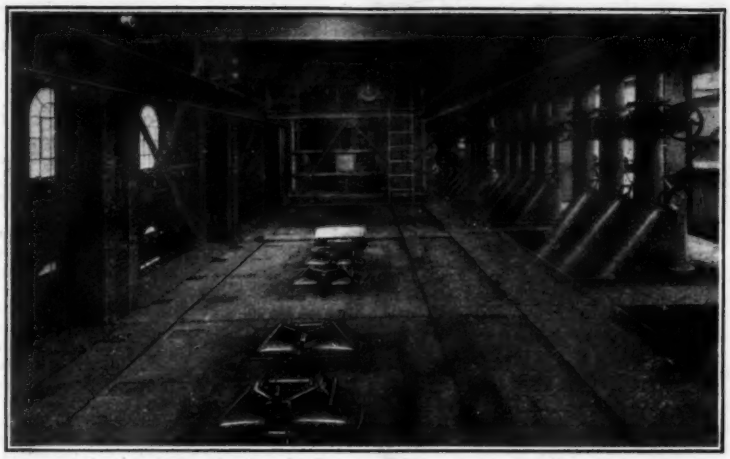
Further Points of Interest.

Coal and Coke Storage Hoppers.—The coal hoppers have a capacity equivalent to 48 hours' maximum requirement of the fifteen chambers. The producer coke storage hoppers have an equivalent capacity.

Chamber Charging Skip.—For charging the chambers with coal, a charging skip having a capacity equivalent to that required for charging one chamber is provided.

Producer Charging Skip.—For charging the producers with coke, a hand-operated skip of a capacity of about 50 c.ft. is provided.

Retort House Governors.—Two 12-in. diameter retort house



TOP OF SETTINGS SHOWING OFFTAKES AND COAL CHARGING MACHINE.

governors, made by Parkinson & Cowan (Gas Meters), Ltd., are installed.

Waste-Heat Boiler.—For utilizing the major portion of the heat contained in the waste gases after they leave the settings and before they are discharged to atmosphere, a W-D waste-heat boiler is provided for raising steam at a pressure of 120 lbs. per sq. in. When all the fifteen chambers are working, it is capable of generating approximately 3750 lbs. of steam per hour from feed water at 60° Fahr. The boiler is of the horizontal firetube type.

One independent exhaust steam feed water heater of the close tubular type is provided to raise the temperature of the feed water to approximately 160° Fahr.

Labour Required.—The plant is operated by two men per 8-hour shift, or a total of 6 men per day.

LUNCHEON.

The visitors were subsequently entertained at luncheon at the Town Hall. Councillor Till presided, supported by the Mayor, the Mayor of Morecambe (Alderman A. W. Gorton), Sir Arthur Duckham, Mr. J. Wilkinson, Alderman Jackson, Mr. Roberts, Mr. W. M. Mason, Councillor Hodkinson, Mr. J. J. Jackson, Mr. P. F. Holmes, Alderman Turner, Sir Nowel W. Helme (a former M.P. for the Lancaster Division), Alderman Oglethorpe, Alderman Nuttall, Councillor Smith, Alderman Walker, Councillor Proctor, Alderman Glasby, Mr. G. Dixon, Alderman Pickup, the Town Clerk of Lancaster (Mr. R. M. Middleton), and Councillor J. C. Wilson, Chairman of the Morecambe Gas Committee.

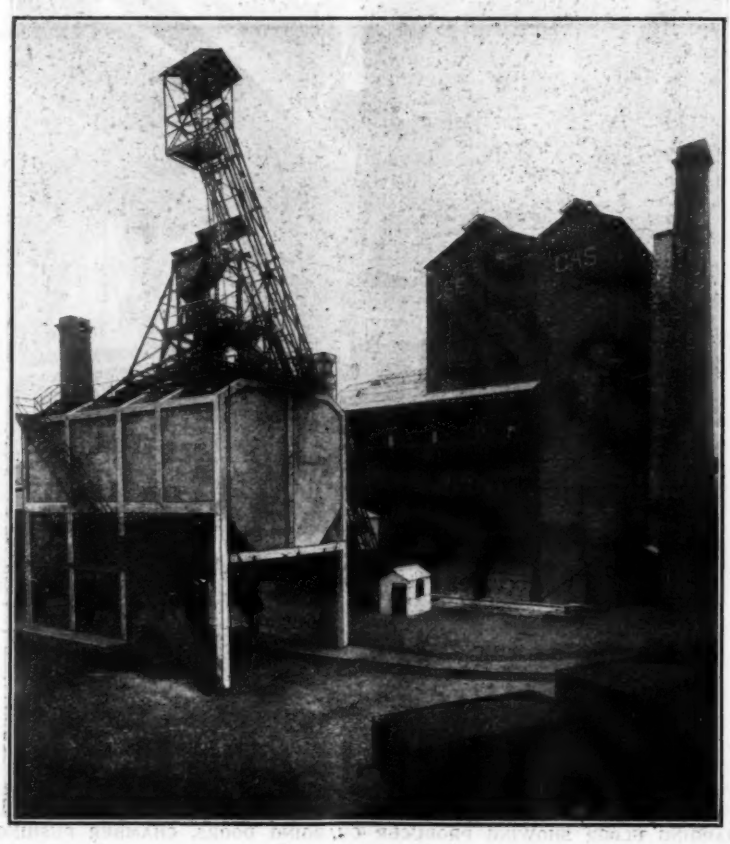
Following the Loyal Toast,

The MAYOR OF MORECAMBE proposed the toast of "The Borough of Lancaster," which was responded to in a humorous vein by the MAYOR OF LANCASTER.

THE LANCASTER GAS DEPARTMENT.

Mr. J. WILKINSON, O.B.E. (Past-President of the Institution of Gas Engineers), proposed the toast of "The Lancaster Gas Department." He said he felt the honour of doing so had not been so much due to his position as the immediate Past-President of the Institution of Gas Engineers as to the fact that he was a native of Lancaster. Apart from the ceremony of inaugurating the new plant, they were also celebrating the centenary of the works as a whole. In the latter connection, he might mention that his great-grandfather on his mother's side was in the employ of the old Lancaster Gas Company, his grandfather was in its employ, his father had served his time there; and his articles, on the completion of his apprenticeship, were endorsed with a message of goodwill from the late Dr. De Nitre. He (the speaker) also served his time there, in company with another apprentice named John Wilkinson, who was one of the "goods and chattels" taken over by the Corporation when they obtained control of the works.

They were celebrating that day the development of an undertaking



THE INCLINED CHAMBER HOUSE, COKE HOIST, COKE SCREENING PLANT, AND COKE STORAGE HOPPERS.

which was formed by a party of far-seeing men who were out—and properly so—to obtain a fair return on the capital which they were prepared to risk in the interests of the townsmen of that good old town. The old Company was formed in 1826, and gas was first supplied in 1827. Even in those days the Press was always to the fore, and on June 5, 1878, it appeared that the "Lancaster Guardian" did not like the idea of the shareholders drawing their 10 p.ct. dividends. Whatever may have happened at that time, it undoubtedly resulted in an agitation which was only settled by the purchase of the undertaking in 1879. According to the few figures which had been published, he found that the price paid for the undertaking was £87,000, and the output of gas was 50 million c.ft. per annum. The capital expended at the time of the purchase equalled £1500 per million c.ft. To-day the debt was reduced to £218 per million c.ft. The Gas Department had paid £74,000 in aid of rates. The citizens were now enjoying a supply of gas at the price of 1s. 2d. for industrial purposes and 2s. 9d. for domestic purposes. Those present who were not gas engineers would understand the great development which had taken place in the works when he told them that he had in his possession the drawing of the first little donkey engine, of not more than 10 n.h.p., which drove the whole of the machinery at the Lancaster Gas-Works sixty years ago.

The Chairman, in responding to the toast, regretted that it had not been possible for Messrs. Armitage, Sen. and Jun., former Engineers of the Works, to be present on account of family bereavement. With the exception of one small works in another part of Lancashire, the present occasion was, practically speaking, the first inauguration of the inclined oven system in the North. The Engineer and himself visited Holland to inspect works, and they had the utmost confidence in recommending the Town Council to adopt the system; one great reason being the ease with which it could be operated.

The Contractors.

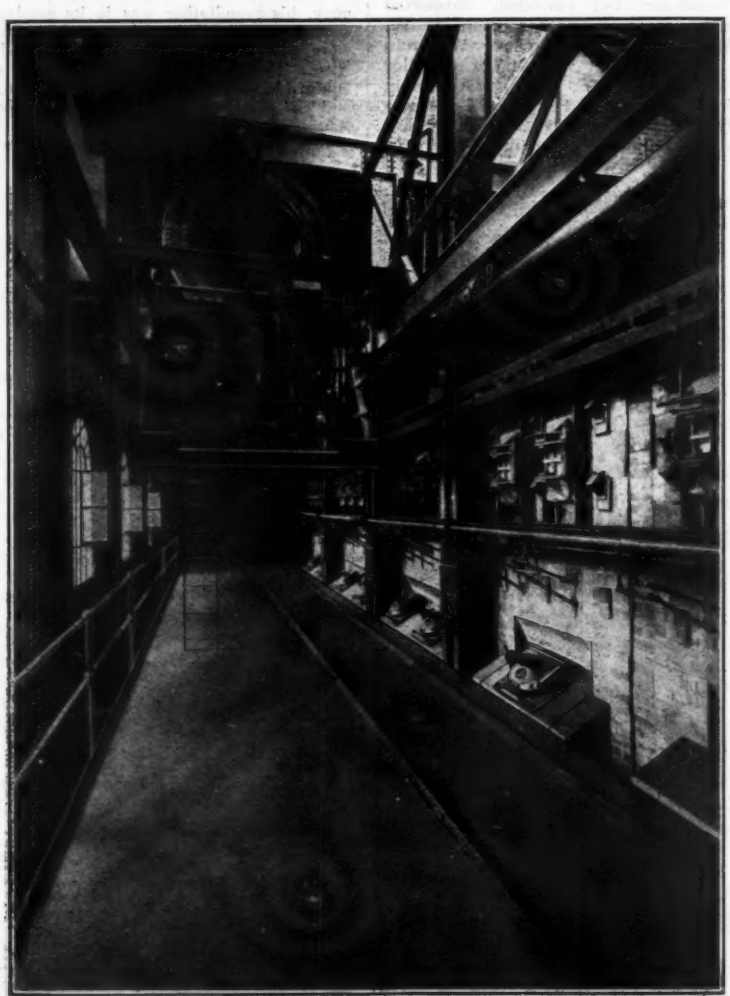
Councillor Hodkinson, J.P., proposed the toast of "The Contractors." He said that the work in connection with the installation had been placed in the hands of three contracting firms: The Woodall-Duckham Vertical Retort and Oven Construction Company, Ltd., Messrs. W. C. Holmes & Co., Ltd., and the local firm of Messrs. J. Johnson. The work entrusted to the first-named firm formed the greater part, and, according to those best able to judge, they had performed their part of the task with a high degree of success. The firm was a well-known one, with more than British reputation, and it possessed a Research Department which kept abreast of all the developments in foreign countries. Sir Arthur Duckham had done a great deal of work at the request of the British Government, and his advice had been sought many times by responsible people. With a gentleman of such high standing as Sir Arthur Duckham behind them, the Lancaster Gas Committee could rest assured that the installation would be productive of good results. Messrs. W. C. Holmes & Co., Ltd., were a Yorkshire firm, and had provided the very important cleansing and cooling machinery. Messrs. J. Johnson were an unobtrusive firm in many ways, but Lancaster people knew well how thorough and efficient their work was.

Sir Arthur Duckham said he was very proud to be present to respond to the toast. Whenever he went on to a plant that his firm had built, he always noticed that the other members of the firm became very nervous. They said he was usually their most severe critic. But, after having thoroughly inspected the new plant, he had great pleasure in telling the Chairman and Mr. Dixon that it was a good one. It had only been operating ten days, but was functioning well. Before the war, his firm were in business relations with a German firm which was known throughout the gas industry—the Stettiner Chamotte Fabrik A.G. After the war, it was found that the German firm owed them money; and it was a difficult thing to get money from Germany then. The German people were building the Woodall-Duckham continuously-working vertical retorts, and this had resulted in considerable business being transacted between the two firms. In the result, Messrs. Woodall-Duckham decided to cut out the money point of view; and an agreement was entered into between the two firms for an interchange of technical information and the mutual use of inventions upon either side. A large proportion of the gas made in Germany, Holland, and France was produced in plants similar to that at Lancaster; and therefore there must be some definite advantage gained by installing them. His firm were proud of the Lancaster plant, and, personally, he was absolutely convinced as to its successful working. It would create a real vitality in the gas supply of Lancaster. One had heard a great deal about electrical development lately, and that there was not much hope left for gas. As a matter of fact, he had recommended his friends to buy gas stock, not electrical stock, and they had all thanked him for his advice. Electricity was well to the front in America, yet in cities like New York, Chicago, and San Francisco the consumption of gas per head of population was considerably greater than in this country.

Mr. D. H. Henshaw (Messrs. W. C. Holmes & Co., Ltd.) also responded to the toast.

The Visitors.

Alderman Jackson proposed the toast of "The Visitors," to which Mr. W. M. Mason (British Commercial Gas Association) responded.



PRODUCER CHARGING FLOOR SHOWING PRODUCER CHARGING DOORS, CHAMBER PUSHING DOORS, AND PUSHER MACHINE.

CHAMBER HOUSE FLOOR SHOWING PRODUCER CLEANING DOORS.

stating that the Gas Light and Coke Company alone produced more B.Th.U. of heat than the whole of the electrical undertakings in the country put together. There was something like 160 million pounds sterling invested in the gas industry of Britain, and about 300,000 men were employed in it.

Sir Nowel W. Helme also responded.

Engineer and Staff.

The Chairman proposed the toast of "The Engineer and Staff," and paid a very warm tribute to the services rendered by them.

Mr. Geo. Dixon, on behalf of the staff and himself, thanked the Chairman for his encouraging remarks.

The proceedings then closed.

[*Photo. by G. Wynopeare Herbert, Lancaster.*

AT THE LANCASTER CENTENARY CELEBRATIONS.

Royal Sanitary Institute.—The 39th Congress and Health Exhibition of the Institute will, at the invitation of the Town Council, be held at Plymouth from July 16 to 21, 1928. The Right Hon. the Viscount Astor has consented to act as President of the Congress.

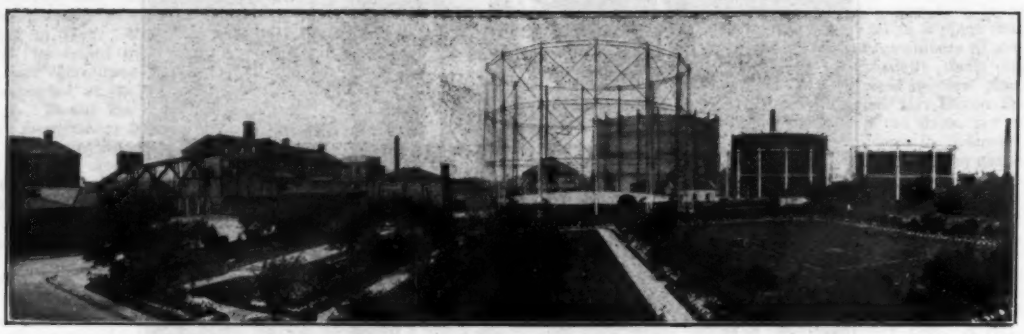
Smoke Problem on Tyneside.—How best to tackle the smoke problem on Tyneside is a subject to be considered at a sessional meeting of the Royal Sanitary Institute, to be held on Friday, Oct. 28, at 4.30 p.m., in the Council Chambers, Town Hall, Newcastle-upon-Tyne.

ALTERATIONS AT THE CAMBRIDGE GAS-WORKS

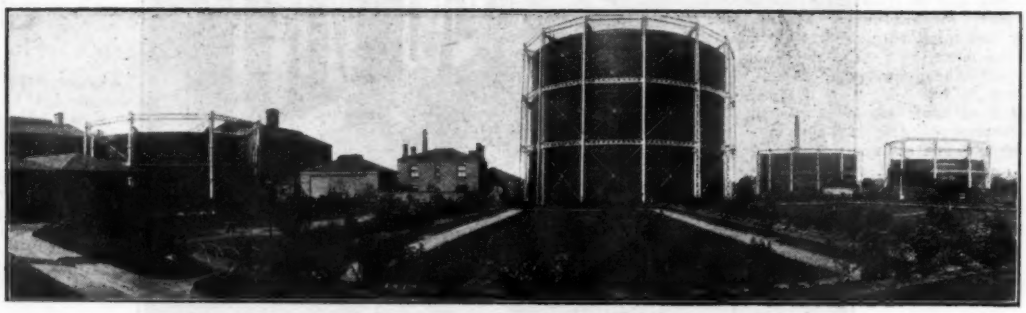
BETWEEN THE 1910 AND 1927 VISITS OF THE EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

By J. W. Auchterlonie.

[A Paper before the Eastern Counties Gas Managers' Association, Sept. 30.]



GENERAL VIEW OF GAS-WORKS (1927).



GENERAL VIEW OF GAS-WORKS (1910).

The last occasion on which the Eastern Counties Gas Managers' Association visited Cambridge was on Sept. 23, 1910; and our worthy President has asked me to give you to-day a brief description of some of the alterations and additions that have been carried out at the gas-works here since that visit.

For the year 1910 our make of gas was 402 million c.ft., and the maximum daily output was 1,766,000 c.ft. For twelve months ended June last the make of gas was 816 millions; and the maximum daily output has reached 3,570,000 c.ft. That is to say, since your last visit seventeen years ago both the yearly make of gas and the daily output have been more than doubled. It is therefore only reasonable to assume that considerable extensions have had to be made to the plant at the works and to the mains on the district during the intervening years. With your indulgence, I shall briefly describe some of these alterations.

Tar and Liquor Storage.

The photograph of the works in 1910 shows a small gasholder in the left foreground. It was 80 ft. in diameter, and of a capacity of 185,000 c.ft. This has been removed, and the tank converted into a tar and liquor storage cistern.

Total capacity, 553,242 gallons.
Diameter, 81 ft.
Height from bottom to underside of beams, 16 ft. 10 in.
Concrete in bottom, 6 in. thick.
Fall of bottom to channel, 1 in. in 5 ft.
Foundations of brick piers, 6 ft. square by 18 in. deep.
Eleven piers of Blue Staffordshire bricks, reinforced with four rods 1 in. diameter, 9 in. centres.
Height of piers from top of footings, 16 ft. 7 in. Sides of tank rendered with 2 and 1 mixture of sand and cement ½ in. thick.
The mixed quantities for the concrete top of tank consisted of 1½ parts of cement, 2 parts of sand, and 4 parts of aggregate.
Main beams, 2 ft. 9 in. deep by 1 ft. 4 in. wide, reinforced with four rods 1¼ in. diameter. Secondary beams, 1 ft. 10 in. deep by 12 in. wide, reinforced with five rods 1¼ in. diameter.
Slabs, 7½ in. thick, reinforced with ½-in. rods, 4 in. centres.

The stand-pipe well adjoining the tank is 23 ft. deep by 7 ft. diameter. The outlet and inlet pipes have been cut-off inside the tank wall, and a channel has been made from the lowest point in the floor of the tank to the pipes leading into the stand-pipe well. This allows the tar to drain into the well, which becomes a tar reservoir, into which the suction pipe of the tar pump is placed. The tank has a cover over the delivery and liquor suction pipes, to enable them to be got at when necessary. The well has a similar cover over the tar suction pipe.

The additional floor space this alteration secured for us was valuable as a coke store, and enabled us to erect a coke conveyor and screening plant to serve No. 1 horizontal retort house.

The illustration shows this plant. The coke is graded into four sizes, and can be loaded either in bulk or into bags.

Storage.

To compensate for the loss in storage caused by the removal of the small gasholder, a flying lift was added to No. 4 gasholder, making the capacity of that holder 810,000 c.ft.—an increase of 270,000 c.ft. The diameter of this lift is 115 ft., and the height 25 ft. 6 in. The pressure thrown by the holder is now as follows: First lift, 6 in.; second lift, 8 in.; third lift, 10½ in.

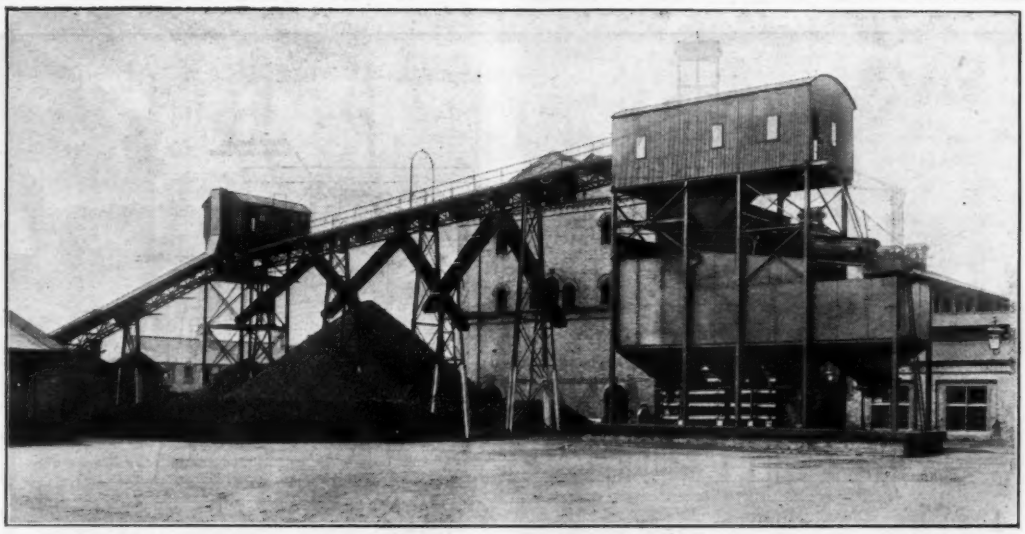
Boiler House and Power House.

A new boiler house has been erected since your last visit. It is 54 ft. 5 in. by 42 ft. 4 in., and contains three Lancashire boilers 7 ft. 6 in. diameter by 30 ft. long. The boilers are fitted with Goodrich & Hamlyn's patent furnaces fed with coke breeze.

The power house is 40 ft. by 23 ft. by 40 ft. high. There are now three generating sets of similar design by Messrs. W. H. Allen & Son, of Bedford. The engines are compound high speed of the enclosed type, coupled direct to the electric generators, and work with forced lubrication. The compound wound dynamos develop 50, 75, and the latest, which is part of our present extension, 175 kw. at 220 volts.

The switchboard is by Messrs. Dorman & Smith, Ltd. It is of enamelled slate, and comprises generator panels, shunt regulator panel, and circuit panels. Each dynamo is provided with fuses and reverse current and overload circuit breakers. The two smaller sets have triple-pole switches, and the new set a double-pole switch. The three dynamos can be run together, and are provided with an equalizing bar and a central zero voltmeter for paralleling purposes. The voltmeter at the top of the switchboard is common to the three generators; and there is also a watt meter for registering the watts absorbed by the various motors throughout the works. Ampère meters indicate the output of each dynamo, and also the consumption by the various motors.

The 175 kw. set was installed in 1924, mainly to provide the extra current required for No. 3 retort house; and on the bottom of the 175 kw. panel in the power house are a double-pole switch and fuses to carry 300 ampères, leading to a distributing panel on the ground floor of the new retort house. This panel is of the same type as in the power house. It is fitted with ampère meters showing the current consumption by the



VIEW OF COKE CONVEYOR AND SCREENING PLANT FOR No. 1 RETORT-HOUSE.

different sections of the retort house machinery, also circuit breakers in the positive and fuses in the negative feeders; and a watt meter registers the total consumption of the retort house machinery.

All the motors in the works have starting panels fitted with overload and "no-volt" release coils; and the current distribution on the works is effected by both underground conduits and overhead transmission lines.

A 2-ton travelling crane is erected overhead for lifting any part of the engines or dynamos when required.

Water Supply.

The main water storage tank, holding 25,000 gallons, forms the roof of the building, and underneath it are two water softening plants placed on the first floor. One is a Lassen & Hjort and the other a "Permutit" plant as made by the United Water Softeners, Ltd., of London. There is a soft water tank of 6000 gallons capacity.

In the basement are two boiler feed pumps, pumping softened water through an exhaust steam water heater. The exhaust steam from the exhauster house and electric generating sets passes through the heaters.

In the pump room adjoining the power house is a three-throw pump (6 in. bore); and this delivers water into the overhead tank from the artesian well, which is about 100 ft. deep. In the same pump room are situated the tar and liquor pumps.

Purifiers.

In our old purifier house we have made some alterations, by taking out six small boxes 20 ft. by 10 ft., and replacing them with three boxes 35 ft. by 20 ft. At that time we still used some lime for purification purposes; and those vessels we used as sulphide purifiers. Owing to the high cost of lime during the war, its use has been discontinued, and those three vessels will be used as catch purifiers when we construct the additional installation of four 50 ft. by 30 ft. purifiers.

Exhausters.

In 1914 a twin set of exhausters, each 50,000 c.ft. per hour, was substituted for a similar set passing only 25,000 c.ft. each per hour.

Station Meter.

The same year a station meter of 30,000 c.ft. capacity was replaced by one of 80,000 c.ft. an hour.

Extracting Benzole.

During the war years, and right up to 1923, only work that was absolutely necessary was undertaken. In 1915 three old tower scrubbers were used for washing the gas with tar, as advocated by Dr. Charles Carpenter; and in 1916 we re-erected a disused washer for the extraction of benzole. A complete plant was installed for us by The Chemical Engineering and Wilton's Patent Furnace Company; and it did very useful work. The washer has been sold, and two of the three 8000 gallon tanks have been utilized as tar and light oil storage tanks on our tar plants.

Water Gas Plant.

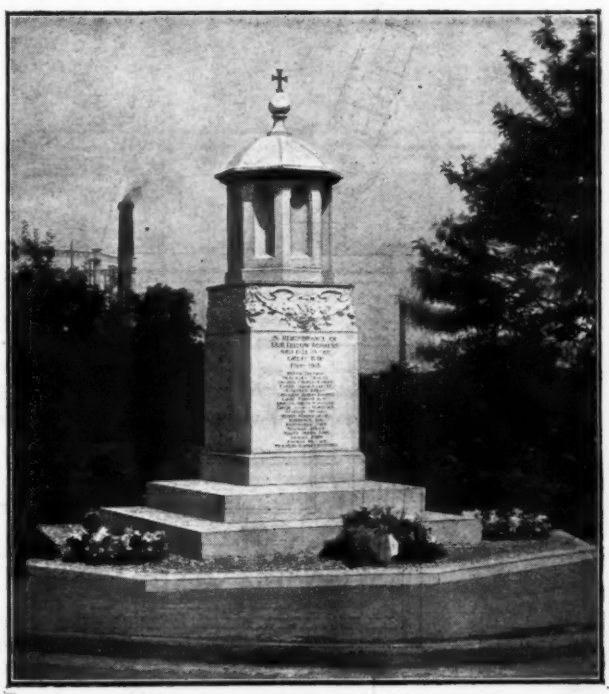
A blue water gas plant of 500,000 c.ft. per day capacity had to be installed as a temporary measure in 1918. It consists of a generator and washer-scrubber with hydraulic seal; provision being made for conversion into a carburetted plant if required. Duplicate sets of Keith-Blackman blowers, driven by 15 H.P. De Laval geared turbines, supply the air blast to the plant through an overhead main fitted with canvas ends. Coke is conveyed to the plant in buggies, which are raised to the operating floor by means of a hydraulic lift capable of raising 15 cwt. from ground level with a hydraulic pressure of 150 lbs. per sq. in.

The water gas plant is connected to No. 3 holder by a main with a branch connecting with the coal gas main at the inlet to No. 1 condenser, enabling sufficient blue gas to be mixed with the coal gas at this point to produce gas of the declared value of 475 B.Th.U.; any surplus water gas passing to No. 3 relief holder. The quantity of blue gas so mixed is measured by a Thorp rotary meter situated on the branch connection.

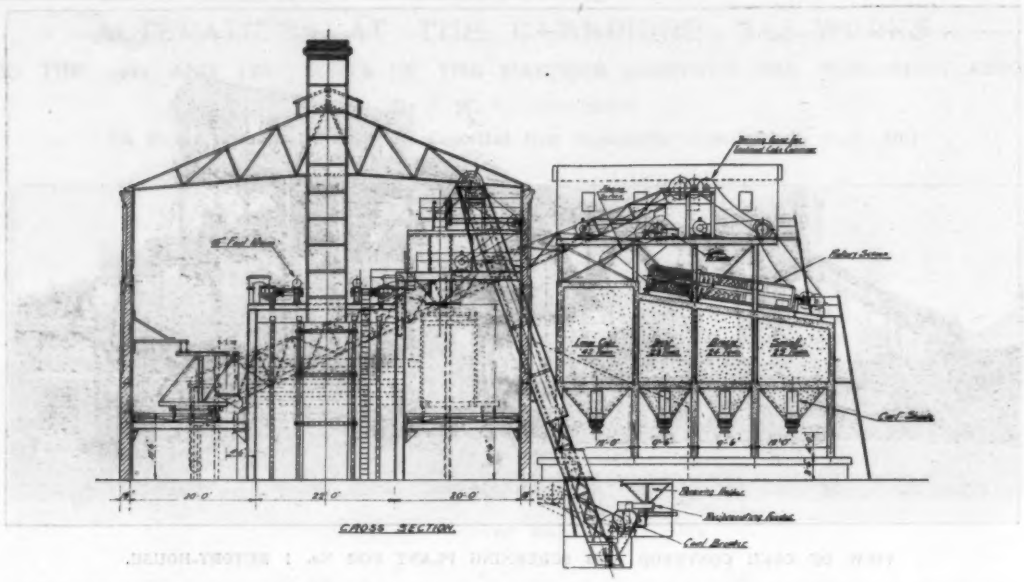
Again in 1921, when the consumption reached 565 millions, and the maximum daily output 2,450,000 c.ft., a second set of 1 million c.ft. blue gas capacity was installed. This also consists of a generator and washer-scrubber with hydraulic seal. A 30 H.P. geared De Laval turbine, coupled to a Sturtevant blower, was put down to supply the air blast for this plant; both plants now being supplied from a common blast main.

Considerable trouble was experienced from a deposit formed in the 12-in. main, between the plant and the holder; and in 1921 this main was replaced by a 16-in. main, with special flanged cleaning doors. A 16-in. atmospheric condenser was also erected outside the water gas plant house. Since this was done, no serious trouble has been encountered from the deposit.

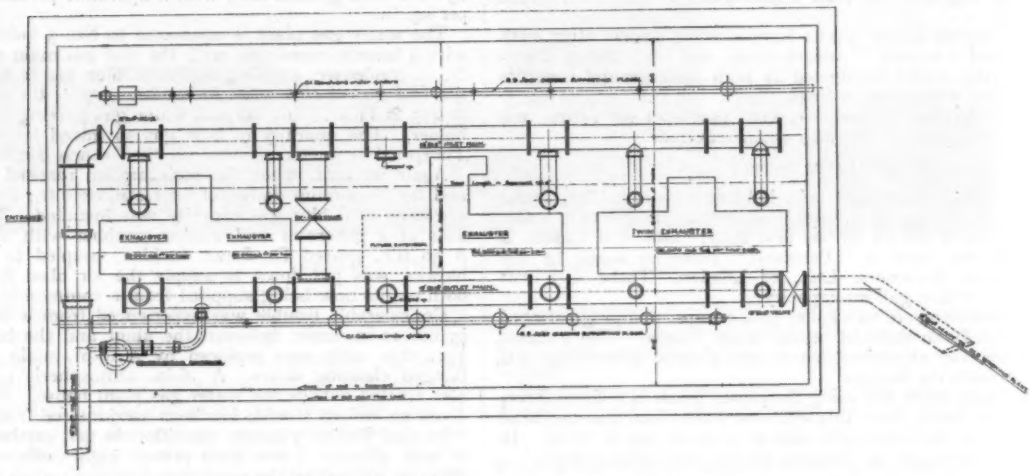
In 1926 Parker's patent centriflovane grit catchers were fitted to both plants. These have proved highly efficient; and their effect in mitigating the coke dust nuisance on our works is very marked. The smallest of the dust removed passes easily



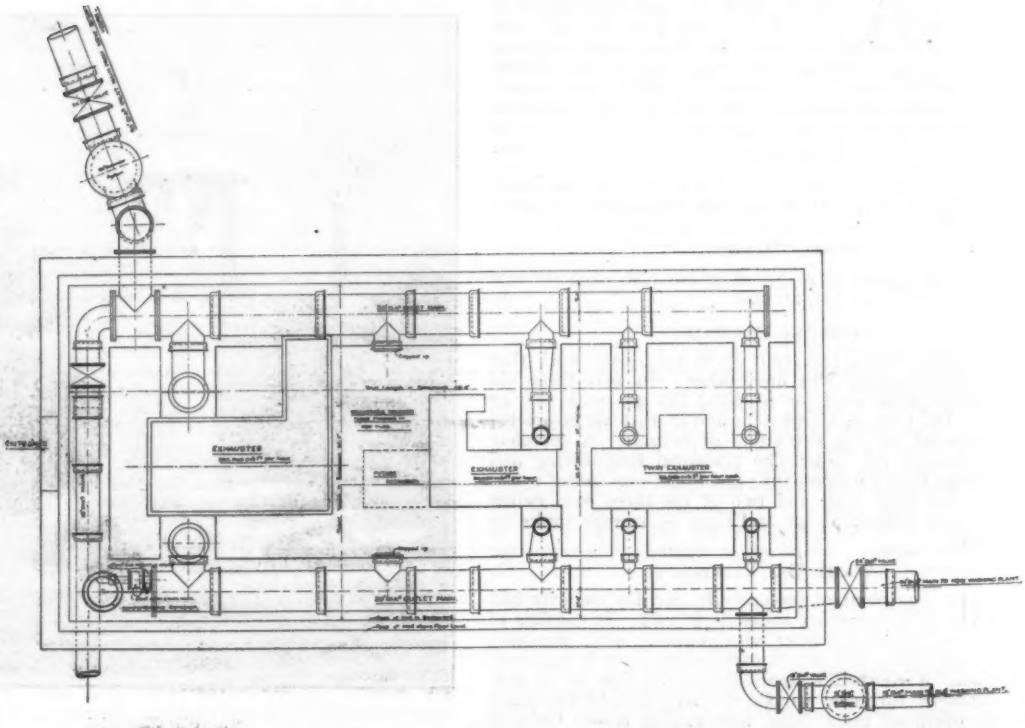
The War Memorial.



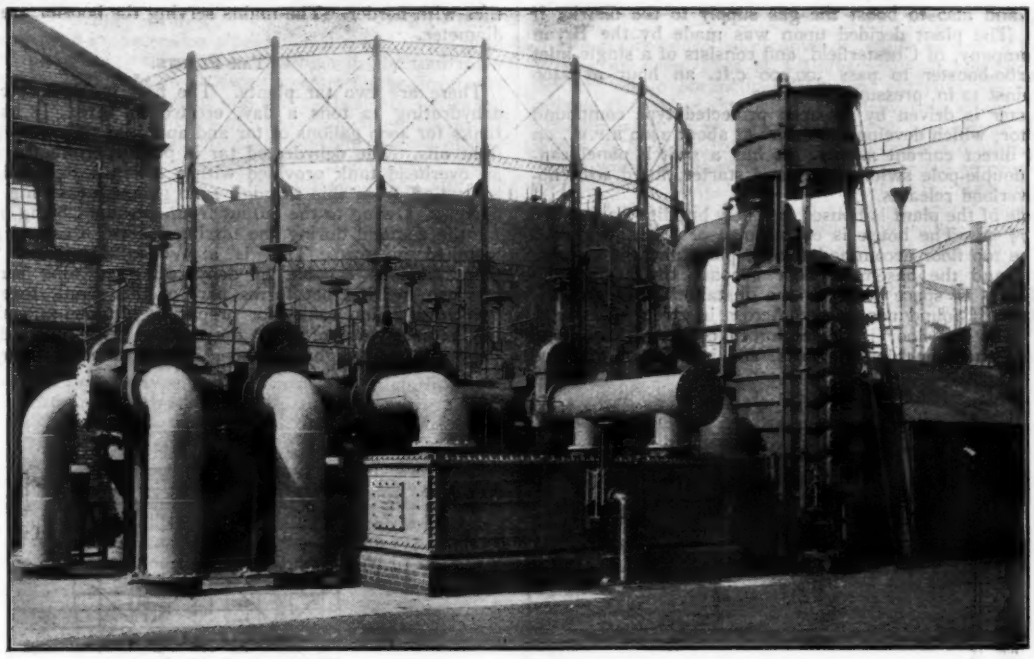
CROSS-SECTION OF NO. 3 RETORT-HOUSE, SHOWING COAL AND COKE HANDLING PLANTS.



PLAN OF EXHAUSTER HOUSE BEFORE ALTERATIONS.



PLAN OF EXHAUSTER HOUSE AFTER ALTERATIONS.



VIEW OF WASHING PLANT.

through a sieve of 120 meshes per lineal inch; and the quantity removed is about 4 to 5 cwt. a day from the two plants, or about 1 p.ct. of the coke used.

A War Memorial was erected in 1921 by the employers and employed, to the memory of 18 of the Company's employees who lost their lives in the great war. It was designed by a local Architect, Mr. John Morley.

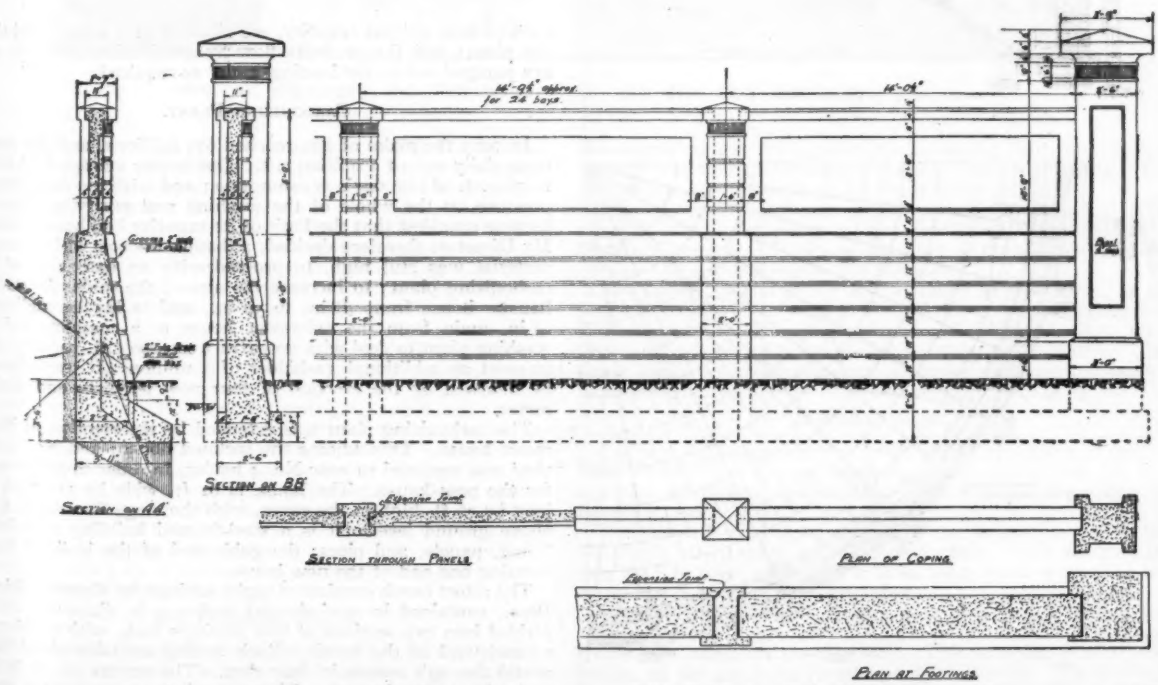
Small Tar and Liquor Storage Tank.

On the plan, between the exhauster house and the power house is shown an underground storage tank for tar and liquor. This tank was in existence prior to my coming to Cambridge in 1902. It is 45 ft. 2 in. internal diameter by 16 ft. 9 in. deep inside. The cover was not sufficiently strong for heavy traffic, being constructed of timber beams and stone slabs resting on a small circular shaft of brickwork in the centre.

In 1922 it was decided to raise the walls and reconstruct the cover of the tank to carry a live load of 20 tons. After cleaning out the tank, it was found that the inner walls were in good order; and I decided that they were strong enough to carry the new top. Nine piers of blue brick, 18 in. square, were built, and these carried the main beams, which were 14 in. deep by 8 in. wide, reinforced with two $\frac{7}{8}$ in. diameter and two $\frac{3}{4}$ in. diameter rods. Into these were trimmed the secondary beams 12 in. by 6 in., with four $\frac{3}{4}$ in. diameter bars; and on the top of both of these, and forming part of it, came the slab top 7 in. deep, reinforced with $\frac{1}{2}$ in. diameter rods at 6 in. centres, placed top and bottom. Openings 3 ft. 6 in. by 3 ft. were left in the top slabs where necessary, for the purpose of getting at the inlet and suction pipes; and these were covered, as in the case of the large cistern, with special covers with grease fitted lutes, consisting of a cast-iron bottom plate and a top dished steel plate filled-up with concrete. Both these plates have a flange on the inside which fits into lutes running round the four sides of the opening, and into which the grease is placed to make the joint. Lugs are fitted to both plates to facilitate removal when required. The capacity of this tank is 165,506 gallons.

Boosting Plant and House.

Owing to our No. 2 gasholder having a pressure of only 8 in., it was in 1923 found expedient to instal a boosting plant, in order to be able to make use of the greater pressure of No. 4



DETAIL OF CONCRETE BOUNDARY AND RETAINING WALL ALONG RIVERSIDE.

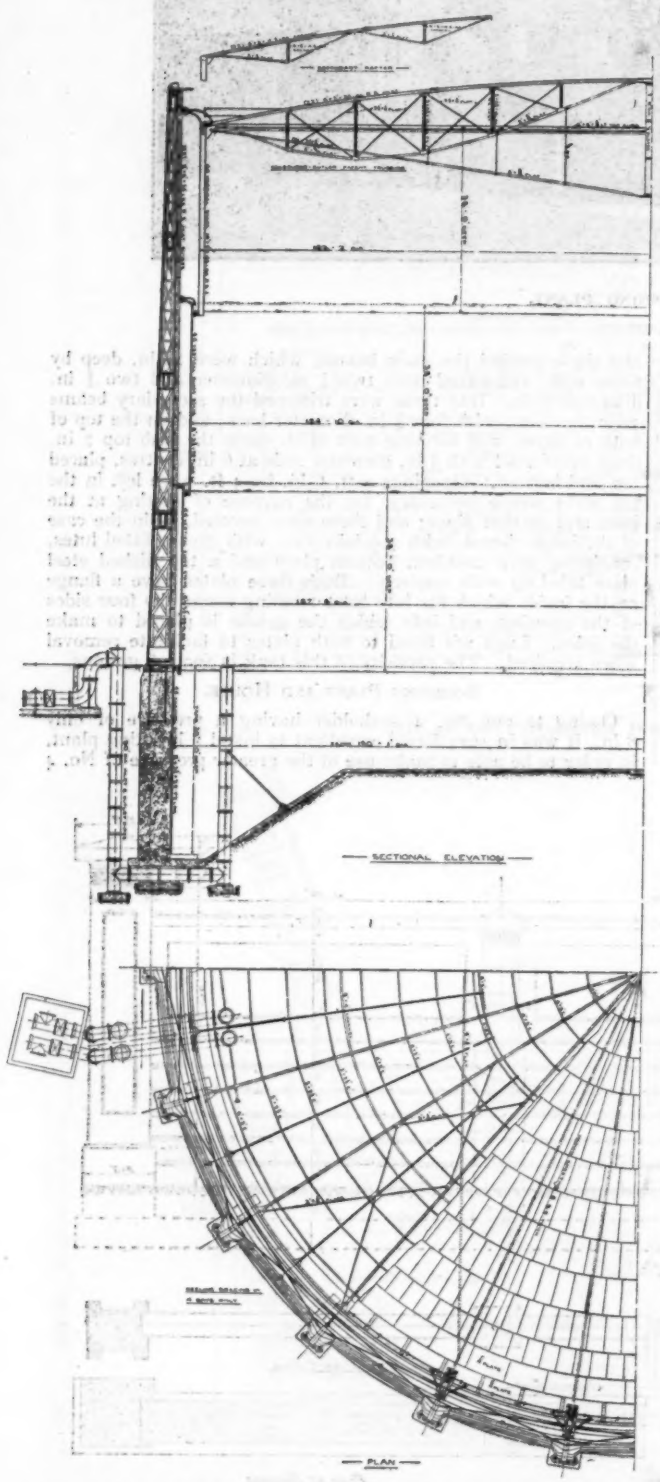
gasholder, and also to boost the gas supply to the district if necessary. The plant decided upon was made by the Bryan Donkin Company, of Chesterfield, and consists of a single inlet Rateau turbo-booster to pass 300,000 c.ft. an hour at 2400 R.P.M., against 12 in. pressure difference.

The booster is driven by an open protected type compound wound motor, which develops 20 B.H.P. at about 2400 R.P.M., on a 220 volt direct current supply. It has a switch panel consisting of double-pole switch fuses and starter, fitted with no-volt and overload releases.

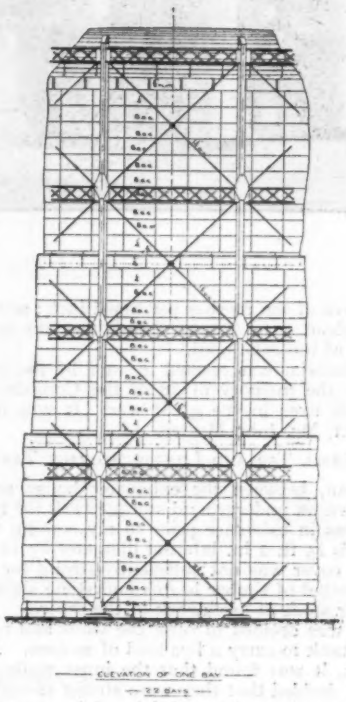
The whole of the plant is housed in a new building 32 ft. 3 in. by 15 ft. 7½ in. The house is constructed of brick, with two floors. The top floor accommodates the plant and the starting panel, &c., and the basement floor beneath the mains and valves. There is space left for the installation of another booster plant, if found necessary. Access is given by an iron staircase. The top floor is of reinforced concrete, with mild steel girders and stanchion supports, and is finished with red tiles with border. The mains serving the booster are of 18 in. diameter.

TAR PLANTS.

There are two tar plants. The first is a Hird, capable of dehydrating 12 tons a day, erected in 1916. It has storage tanks for 4000 gallons of tar and approximately 4000 gallons of light oils. The dehydrated tar is pumped from the former to an overhead tank provided with a steam-heated coil, and can be run-off from this through a 40 gallon measuring tank into barrels. Owing to the output from this plant being insufficient for the demand during the tarring season, a second plant was installed in 1926. This is a Woodall-Duckham "T.I.C." plant, and is capable of dehydrating 20 tons per day. A bitumen melting pot forms part of this plant, together with two 1000 gallon tanks for preparing bitumen-tar mixtures of any required proportions; the mixing being effected by compressed air. A light oil and a steam-heated tar storage tank, each of 8000 gallons capacity, are situated at a lower level than the plant; and the products flow by gravitation to these, and are pumped out to the loading tanks as required.



GENERAL ARRANGEMENT OF THREE-LIFT GUIDE-FRAMED GASHOLDER, 3 MILLION C.FT. CAPACITY.



CARBONIZING PLANT.

In 1923 the make of gas reached 673 millions, and the maximum daily output 3 million c.ft. Our holder storage had fallen to 56 p.ct. of one day's consumption; and with increasing back pressure on the whole of the washing and purifying plant, it became manifest that the limit of its capacity had been reached. My Directors therefore decided, although the cost of labour and material was still high, to proceed with an extension of the carbonizing plant; to increase the size of the mains in the exhauster house from 18 in. to 30 in., and to lay an additional 24-in. main from the exhauster house to a complete unit of washing plant to deal with an extra 3,000,000 c.ft. per day; and to erect an additional gasholder of 3 million c.ft. capacity—to be followed by the erection of four new purifiers and station meter.

The carbonizing plant was extended by the erection of No. 3 retort house. This adjoins the inclined house; and No. 2 coal shed was removed to near No. 4 holder, in order to make room for the new house. The house is 62 ft. wide by 112 ft. 6 in. long by 46 ft. high to the eaves, with the stage floor 10 ft. 6 in. above ground level. It is a steel-framed building with brick filling, panels, and piers; the gable end of the inclined house forming one end of the new house.

The retort bench consists of eight settings by Messrs. Gibbons Bros., contained in semi-circular arches 9 ft. diameter, and is divided into two sections of four settings each, with a chimney at each end of the bench. Each setting contains eight horizontal through retorts in four tiers. The retorts are 24 in. by 15 in. by 22 ft. through. They are of the same section as in No. 1 house, but are 2 ft. longer. The regenerators are of

Gibbons and Masters' patent type; and the producers are fitted with Meade's " Grille " grates.

There are two 7-in. ascension pipes to each retort, fitted with Cort's anti-dips; and level gauge conditions in the foul main are obtained by means of two Cowan's retort house governors situated on top of the bench near one end. These are controlled from stage-floor level by means of valves which enable water to be run into or drawn-off from water containers fixed on the counterbalance arms of the governors. Simmance " Dead Beat " indicators and " Bristol " vacuum recorders, situated close to these control valves, show the pressure conditions at the inlet and outlet of the governors. The level of the liquor in the hydraulic mains is controlled by weir valves on the tar towers, of which there are four—one at each corner of the bench—collecting the tar separately from each side of the two sections.

From the retort house governors a condensing main round the inside wall of the house leads to the new condenser. This is by Messrs. W. C. Holmes & Co., of Huddersfield, and is of the vertical water-cooled type, with tubes fixed at a slight angle from the horizontal. It has a capacity of 2 million c.ft. per day.

Coal Handling Plant.

The coal handling plant consists of a receiving hopper below ground level, with a jigging tray feeding on to a coal breaker, driven by a 12 H.P. totally enclosed motor. Coal is elevated from the breaker by means of a bucket elevator having a capacity of 30 tons per hour at a speed of 100 ft. per minute, which discharges on to a 20-in. push-bar conveyor extending the full length of the overhead hoppers in the retort house. The elevator and conveyor are driven by another 12 H.P. motor similar to the above. The hoppers have a total capacity of 240 tons of coal, sufficient for 48 hours' supply, and are supported on R.S. joists carried on the top of the bench buckstays at one end, and on brackets attached to the building stanchions at the other. The hoppers are divided so that there is a separate compartment for each bed, with one outlet for each vertical row of retorts.

The stoking machinery is by Messrs. W. J. Jenkins & Co., of Retford, and consists of a De Brouwer charger and a separate discharger of the latest type, with 2 ft. links. Each machine is fitted with an 11 H.P. motor for travelling and hoisting. An 11 H.P. motor operates the ram on the discharger; and the charging motor is of 6 B.H.P. and shunt-wound, with rheostat speed control ranging from 250 to 1500 R.P.M. Cut-out switches are provided on both machines, to prevent the hoisting chains being strained by attempting to raise the machine too high. Automatic safety catches are fitted, to prevent the hanging frames from dropping if the hoisting gear fails; and a cut-out is also arranged to prevent the discharger over-running its sprocket drive when discharging.

Coke Handling Plant.

The new coke handling plant consists of a coke bus, conveyors, screening plant, and storage hoppers. The coke bus directs the coke as discharged from the retorts into the producer or conveyor, as may be required. It is driven by a 4 H.P. motor.

The retort house coke conveyor, which is 2 ft. 9 in. wide by 1 ft. 4 in. deep, rises at a slight angle at one end, where it delivers on to an inclined conveyor carrying the coke across outside the end of the house, and delivering either into a coke breaker or on to a rocking bar screen, and thence to a rotary screen 24 ft. long, rotating about 20 times a minute.

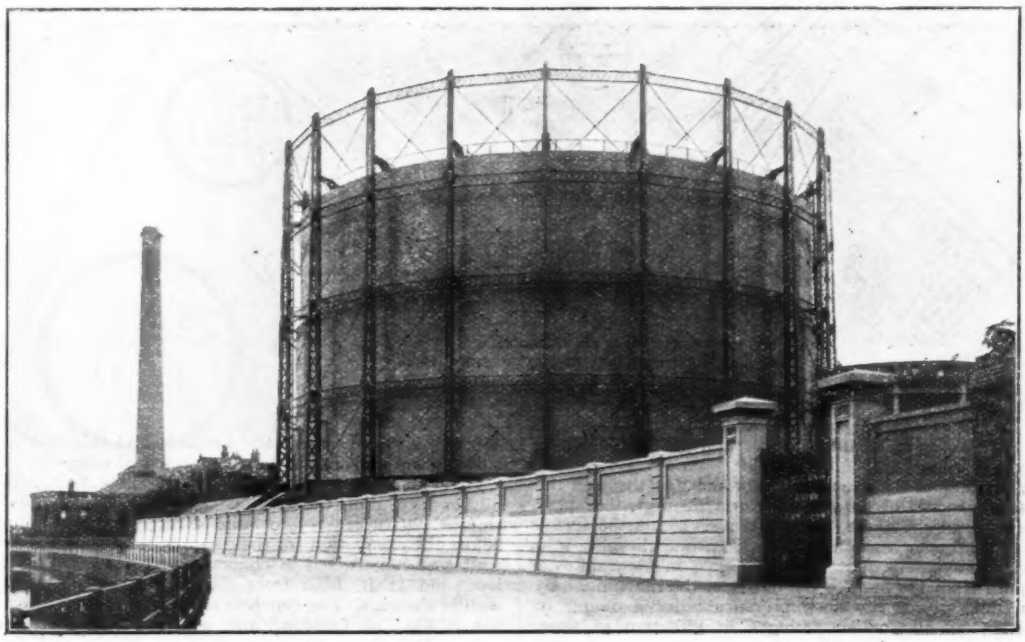
The whole of the screening plant is carried on reinforced concrete bunkers 44 ft. by 15 ft. by 31 ft. 6 in. high from ground level. These latter are divided into four separate compartments for large coke, dust, breeze, and small coke. Each compartment is fitted with a bagging shoot at the bottom, and side shoots for filling carts.

The retort house conveyor and the breaker are driven each by an 8 H.P. motor. The driving gear for the inclined conveyor and screening plant is situated in the cabin over the hoppers, and is operated by a 12 H.P. motor. Starting panels for all these motors are fixed in the retort house.

The house is worked on twelve-hour charges; and one tier of retorts is charged every two hours—*i.e.*, at 6, 8, 10 a.m., 12 noon, 6, 8, 10, and 12 p.m.—thus enabling the house to be worked with only two shifts of stokers a day.

Exhauster House Modifications and Additions.

The substitution of 30-in. mains for the then 18-in. mains was an exceedingly interesting problem. I give you a plan showing the mains before and after the alteration was completed; and I think you will agree that to make the alterations and continue the supply of gas throughout the operation with our limited storage was more interesting than any cross-word puzzle. We had only to shut-down twice for eight hours each time.



VIEW OF BOUNDARY AND RETAINING WALL AND THE NEW GASHOLDER (No. 1).

A new exhauster to pass 300,000 c.ft. an hour against 2 in. vacuum and 60 in. pressure was purchased from the Bryan Donkin Company. This was laid down in the position formerly occupied by a small 50,000 c.ft. exhauster.

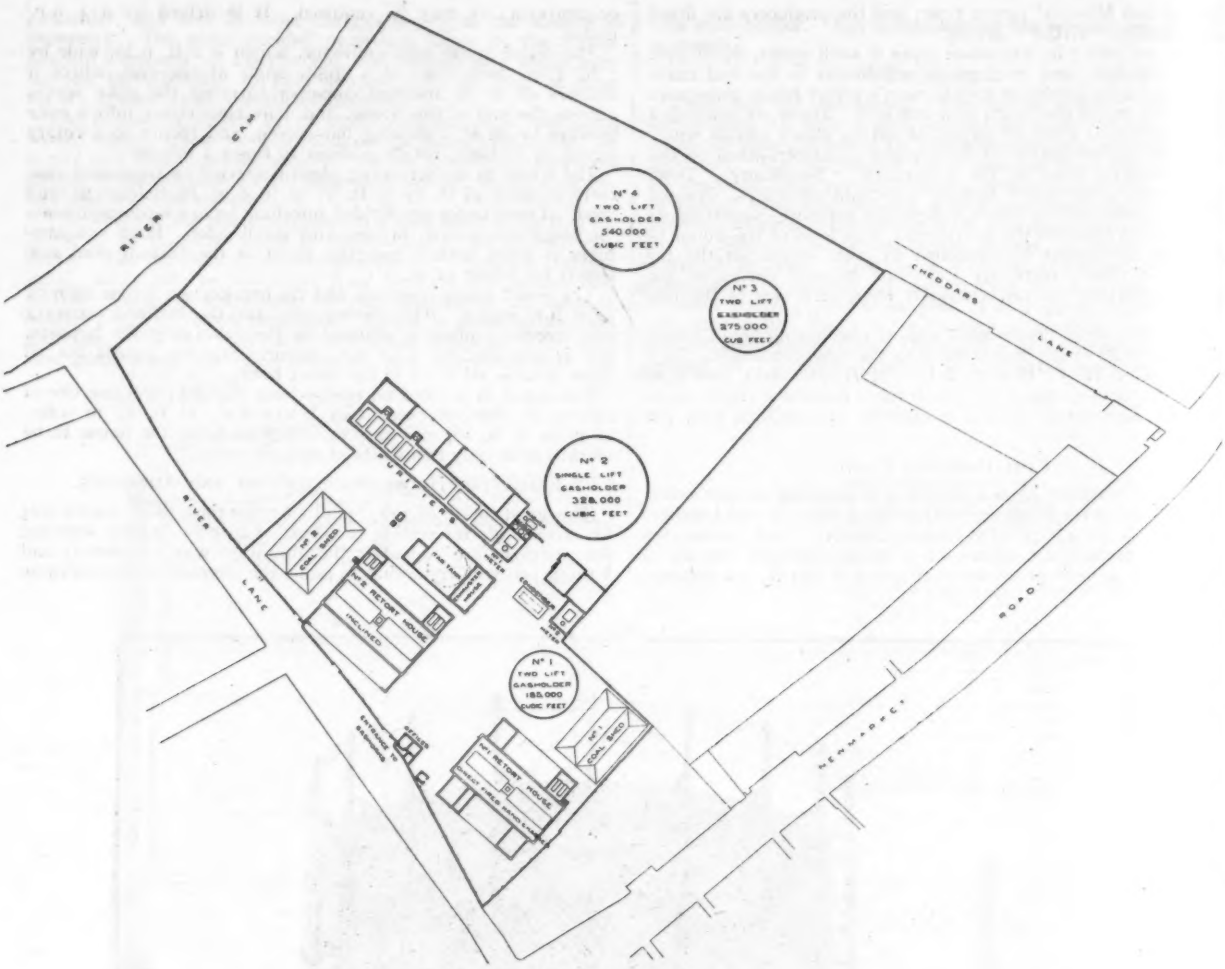
The house did not lend itself to much improvement, as its position ruled out any extension. A new floor of reinforced concrete was constructed, and covered with red tiles, with chequered plates over the mains to give ready access. The house had also an insufficiency of light; and larger windows were built-in, making the increased area of light 155 sq. ft.

Washing Plant.

The new washing plant comprises a Livesey washer, a centrifugal washer, and a rotary washer, all of 3 million c.ft. per day capacity, with 24-in. connections. This was put into action in February, 1926.

The Livesey washer is used as a tar extractor, and is of Messrs. W. C. Holmes & Co.'s manufacture. It is a box 15 ft. long by 7 ft. 6 in. wide by 3 ft. 6 in. deep, built of plates $\frac{3}{4}$ in. thick, and contains 45 Livesey tubes.

The centrifugal washer is used as a preliminary washer for working-up the liquor strength, and is of Messrs. Kirkham, Hulett, & Chandler's manufacture. This machine is of a new design, as the gas is subjected to a spiral travel. The internal diameter of the washer is 6 ft.; and it contains eight spraying



PLAN OF WORKS IN 1902.

(The year Mr. Auchterlonie took over the management.)

chambers. It was installed under very rigid guarantees as to performance.

The main feature of the spiral travel of the gas through the washer is that, instead of passing upwards through the spray in the superimposed chambers, the gas travels round the spraying device, and up over a sloping baffle from one chamber into the chamber immediately above it. The gas, in fact, takes a corkscrew path from the inlet to the outlet of the machine. By this means, not only is the back pressure reduced owing to the elimination of all sudden changes in direction of flow, but the length of travel subject to spray and the time contact between gas and spray are considerably increased. The spraying device in the washing chambers consists of what is virtually a vertical centrifugal pump. The liquor is raised by the lifting vanes or impellers of the pump, and is ejected through a series of distributing cones and a perforated rim in the form of a fine spray.

The machine runs at the rather high speed of 230 R.P.M.; but the moving parts are comparatively light, and the machine-cut gears run in a gear box immersed in oil. After one preliminary adjustment, no trouble has been experienced. The washer has been running continuously for thirteen months, and is notably silent in operation. The power required to drive it is just under 5 B.H.P.

The rotary washer is used as a clean water washer, and was made by Messrs. W. C. Holmes & Co. In this machine it is impossible for any by-pass to occur from cylinder to cylinder. It consists of two units, each having five cylinders 9 ft. internal diameter. The washer is driven from the centre, by means of a steam engine and spur gear. It can be worked with either section alone, if desired.

Each washer is provided with inlet, outlet, and by-pass valves, which are situated overhead, and can be operated easily from a raised platform, access to which is by ladder.

GASHOLDER.

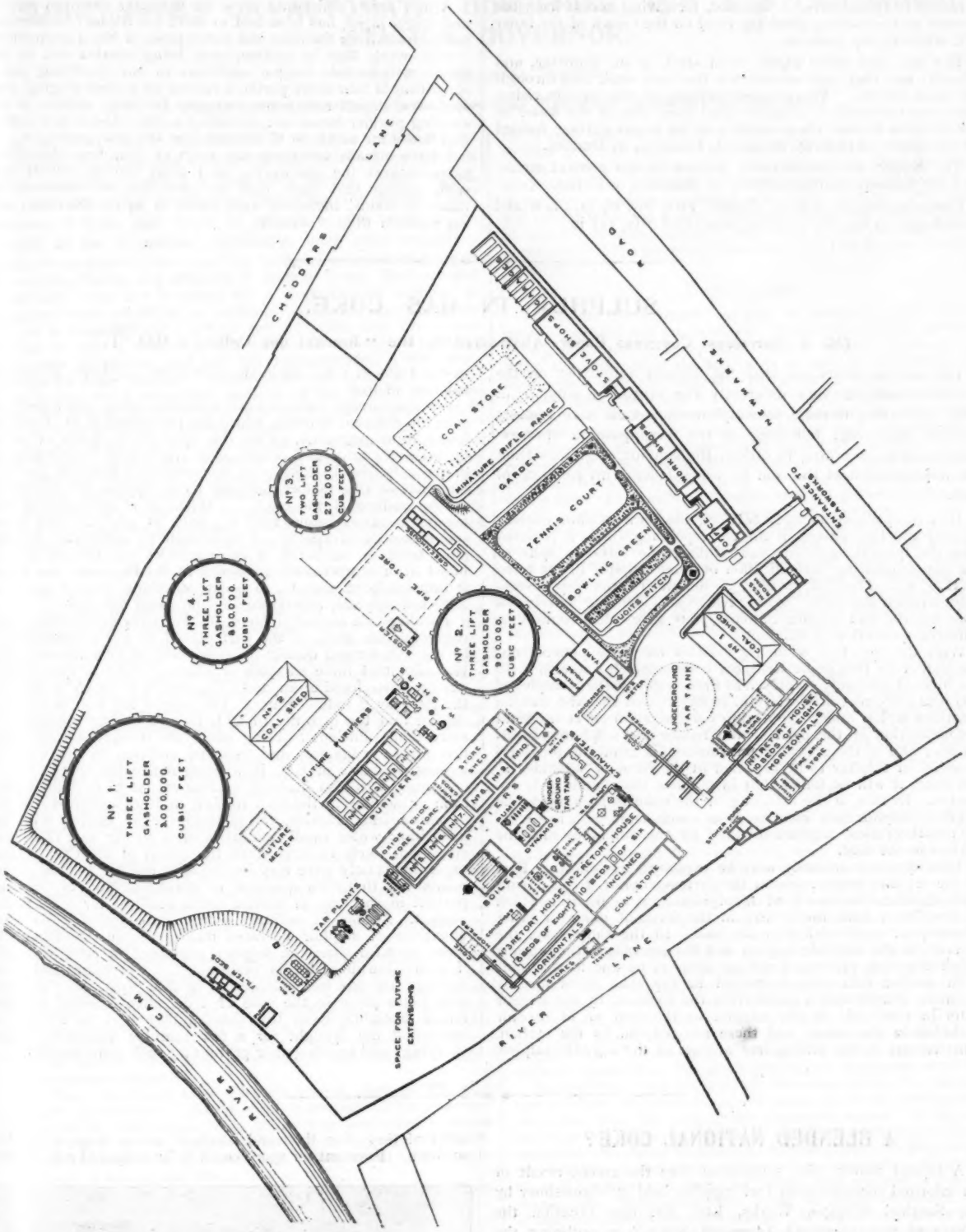
The most suitable position for the new gasholder was found to be in the north-east corner of the works, adjoining the river-side and the Corporation pumping station respectively. In order to take full advantage of the ground space available, it was arranged that the holder should have a capacity of 3 million c.ft., with a tank 190 ft. in diameter. Trial holes were sunk to determine the nature of the ground; and this was found to be suitable for the tank to be constructed of concrete.

Owing to the site chosen for the new holder being at a higher level than the ground sloping down towards the river-side, it was necessary to build a retaining and boundary wall before the excavation for the concrete tank could be made. The wall was constructed in concrete, and is approximately 412 ft. long and 11 ft. high from the road level. (A section of the wall is shown.) The concrete tank was built by Messrs. Robinson & Co., of London, and was commenced in September, 1924. The diameter is 190 ft. 1 in. inside, and the depth is 38 ft. from the top of the coping to the top of the rest blocks.

The floor of the tank is horizontal at a level of 39 ft. below the coping for a distance of 7 ft. from the wall; and from this point the cone starts to rise at a slope of $1\frac{1}{2}$ to 1—the top of the cone being 17 ft. 6 in. below the coping at the centre, with a fall of 6 in. towards the outer edge. The foundation for the tank wall is 1 ft. 6 in. thick; and the thickness of the wall is 4 ft. for a height of 14 ft. From this point it reduces at the back with a regular batter of 1 in 14 to a thickness of 2 ft. 3 in. at the top between the piers; and the external side of the wall and piers are puddled with clay 2 ft. thick for a depth of 28 ft. There are 22 piers equally spaced around the tank, projecting for a distance of 6 ft. 5 in. from the inside face of the wall, and 6 ft. wide.

At a distance of 3 ft. from the top of the wall, then at regular distances of 4 ft. 6 in. down, seven steel bands $4\frac{1}{2}$ in. wide by $\frac{5}{8}$ in. thick are built into the wall at 1/3rd thickness from back for strengthening purposes. There are also 242 oak blocks built into the wall, and projecting $\frac{1}{2}$ in. from the face. These are placed in line with the centre of the piers, and in intermediate positions; and to these the channel guides are fixed. The top of the cone inside the tank is covered with concrete 6 in. thick, and the sloping portion with concrete 9 in. thick.

A concrete pier 3 ft. square, and to a height of 14 ft. 6 in. below the level of the coping, is built in the centre of the tank, to take the weight of the centre post of the gasholder when grounded. Spaced at equal distances round the bottom of the tank there are 44 concrete rest blocks, 5 ft. 6 in. by 2 ft. by 1 ft. deep. The coping around the tank is finished-off with hard Yorkshire stone; that at the piers being 1 ft. 3 in. thick, and between the piers 6 in. thick.



PLAN OF WORKS IN 1927.

The tank was completed in February, 1926; and the erection of the gasholder was commenced in the same month—the contractors for this being Messrs. C. & W. Walker, Ltd., of Donnington, Shropshire. It is a three-lift guide-framed holder, and the capacity is 3 million c.ft. The inner lift is 182 ft. 2 in. diameter by 38 ft. deep, the second lift 184 ft. 10 in. diameter, and the third lift 187 ft. 6 in. diameter. The crown is dome shaped, having a rise of 10 ft. in the centre, with radial sheets.

The crown framing consists of Milbourne-Cutler patent trussing; there being 22 main rafters and 22 secondary rafters with 11 rings of bracket bars. The framing is braced laterally with four bays of diagonal bracing; and in addition two further lines of bracing are fixed across the crown. The hydraulic cups are 1 ft. 8 in. deep; and the skirting plate on the dip is extended 3 in. above the channel, to give additional seal. The inner lift is provided with both radial and tangential rollers, and the second and third lifts with radial rollers only.

Particular attention has been given to the design of the guide framing, to prevent as far as possible any pockets being formed which would hold water or be inaccessible for painting, and so tend to cause corrosion. This was found to be the case on our previous holder, the lattice standards of which had double angles back and front, with the lattice bars riveted between—thus leaving a space between the angles, which it was found necessary to fill-up with cement. In the present case, web plates are riveted between the front and back angles, extending the full length of the standard, and the lattice bars are riveted to these web plates. There are 22 standards, each surmounted by a cast-iron quadrant finial, and standing on a cast-iron base 9 in. high; the total height of the standards being 117 ft. 6 in. from the top of the cast-iron base. The width at the base is 4 ft. 6 in., and tapers to a width of 2 ft. at the top. There are four tiers of lattice girders, each 3 ft. deep, with channel members top and bottom, and connected together with flat lattice bars.

Sloping ladders are fixed to the standards, with chequered plate landings on each of the three lower tiers of girders. In addition a vertical ladder extending from top to bottom, and

attached to the girders, is provided, for giving access from the ground to the landing-platform fixed on the crown of the inner lift, while in any position.

The inlet and outlet pipes are of steel, 30 in. diameter, and riveted; and they pass underneath the tank wall, and through the cone inside. The gas connections on the outside rising pipes are taken-off at a higher level than that of the water in the tank, to prevent the possibility of the mains getting flooded at any time—as recently happened, I believe, at Dundee.

The holder was considerably delayed by the general strike, and the consequent impossibility of obtaining material.

Pressures thrown are as follows: First lift, 6½ in.; first and second lifts, 9 in.; first, second, and third lifts, 11¼ in.

A new main, consisting of 30 in. diameter cast-iron socket-and-spigot pipes, has been laid to serve the holder; connections being made from the inlet and outlet pipes of No. 4 gasholder.

New work that is contemplated being carried out in the future will include further additions to our purifying plant, consisting of four more purifiers erected on a steel staging with roof over, together with the necessary building, similar to our existing purifier house and adjoining same. Also a new meter, and house for same, to be erected near the new gasholder.

I have already taken up too much of your time describing extensions at the gas-works, so I shall content myself now with stating that since 1910 we have laid an additional 26 miles of mains, including 1308 yards of 24 in. diameter, and 844 yards of 18 in. diameter.

SULPHUR IN GAS COKE.

[M. R. Forrières' Congress Paper—Abstracted by the "Journal des Usines à Gaz."]

The author points out that the various authorities on the question interpret very differently the origin of sulphur in coal. According to some, the sulphur compounds have a purely organic beginning, following on the decomposition of vegetable matter; according to others, the sulphur originates from the impregnation of the coal by water laden with sulphate of iron.

If a comparison is made between the total sulphur content in coal and the content in the corresponding coke, it is noted that the quantity remains substantially the same in spite of the removal during carbonization of some sulphur in the form of H_2S, &c. There is, further, no definite relationship observable between the two. Again, two coals, identical as regards their volatile and sulphur contents, may give cokes containing different quantities of sulphur.

With the object of adducing reasons for these phenomena, the author of this paper analyzed comparatively, according to the method normally employed in French gas-works, samples of gas coal and gas coke. Careful study showed that the various reactions which take place during carbonization effect the total decomposition of the pyrites, and reduce the sulphate to sulphides; and if theoretical determination is made of the total quantity of sulphur to be expected in the form of sulphides in the coke, it will be found that in practice that quantity is exceeded. In fact, if the retorting of the coke is prolonged, the sulphide sulphur may increase to as much as 42 p.ct. in excess of the theoretical amount dictated by the sulphates and the pyrites in the coal.

This apparent anomaly may be explained as follows. Part of the organic sulphur and of the pyrites sulphur, freed during carbonization, becomes fixed in sulphide form by the iron which is co-existent with the pyrites in the form of oxide or other non-sulphur combination in the coal. In the same way, the increase in the sulphide sulphur and the decrease in the organic sulphur during prolonged coking seem to be due to reactions with similar iron salts contained in the coke mass already formed. Ferric oxides result from the fixation, by the ferrous salts in the coal, of the oxygen in the coal or in the air occluded in the mass; and these are reduced by the carbon. This results in the setting-free of part of the organic sulphur in the form of CS_2, while the remainder combines to form a sulphide of iron.

Certain foreign writers have explained these phenomena in a totally different manner, which the researches of M. Forrières lead him to contradict. They rely upon the tendency of metallic sulphides to oxidize readily, and argue that "the oxidation of the sulphides in coke is at the maximum towards 500° C., and that at this temperature the freed sulphur is 'adsorbed' at the surface of the coke." When it is remembered that sulphur oxidizes below 120° C., boils at 445° C., and burns spontaneously at 246° C., it is difficult to admit that the sulphur freed by oxidation of the sulphides can remain uncombined at a temperature of 500° C. M. Forrières has found it impossible at 500° C. to isolate anything beyond traces of adsorbed sulphur, recoverable by the usual solvents.

Turning to a second problem, M. Forrières gives information regarding his study of the part played as a "desulphurizer" by the CO_2 formed during the quenching of incandescent coke. He submitted three samples of identical coke to quenching—one by water freed of air and CO_2, one by ordinary water, and the third by "soda" water. The results led him to the conclusion that the quantity of CO_2 formed during quenching is more than sufficient to bring about the maximum decomposition of the sulphides, and that the addition to the water of various amounts of CO_2 is without noticeable effect.

A study was also made of various means of desulphuration, such as adding to the coal foreign matter—sodium carbonate or ammonium chloride, for instance—or by mixing with the quenching water small quantities of a strong acid (HCl was employed) likely to strengthen the action of the CO_2. These experiments only gave very inconclusive results; but the author points out that this question of desulphuration is only important in the case of special cokes destined for a particular market. As far as ordinary cokes are concerned, the small quantities of sulphur liberated during combustion cannot be more harmful than the sulphur contained in coal, especially if a free-burning fire is maintained. Corrosion and other damage are due to condensation in flue pipes, &c.; and this only takes place in the case of a defective chimney or indifferent draught. Even this disadvantage may be avoided by increasing the draught for a few minutes immediately after charging; and so altogether preventing such condensation.

A BLENDED NATIONAL COKE?

A topical motor coke suggestion was the recent result of an informal conference on fuel supplies held at Shrewsbury by the Sentinel Waggon Works, Ltd. On that occasion the Editor of the "Sentinel Transport News," in outlining the available combustibles for steam lorries—20,000 of which, it was stated, are on the roads—pleaded for something new: "Why do not the gas-works produce a blended, graded coke—after the example of National Benzole mixture? This will be a sure way, in my opinion, towards big sales; and it will be wise to remember that the steam wagon world is on the verge of a gigantic boom. So far, coke has only been tried by a percentage of lorry users. For this the trade must certainly be blamed; there is a lack of propaganda, of 'nationalizing' of the district supplies. 'Sentinel' needs alone are the equivalent of a quarter of a million tons a year at present." For "Super-Sentinel" use, 2-in. nuts were favoured. A hundredweight of coke was sufficient for about sixteen miles. Users, it was to be remembered, thoroughly objected to buying a hundredweight or so of water with every nineteen hundredweights of fuel. The best way of increasing coke sales was by advertising; and the trade might well find bill-boards on the sides of (say) five thousand hauliers' steam wagons the best medium. Payment for space could be by means of coke credits.

A "Sentinel" Lorry bearing a suggestive bill-board.

The present is an ideal time for a "Motor-Coke" campaign.

Hints, also, might be gained from the oil companies' campaigns.

SOME NOTES ON AUTOMATIC GOVERNING AND A SELF-LOADING STATION GOVERNOR.

By W. Carmichael Peebles.

[A Paper before the Eastern Counties Gas Managers' Association, Sept. 30.]

In the short time at my disposal it would be useless for me to attempt anything like a complete description of the different types of governors which I have come across. Many ingenious and interesting devices for controlling the pressure and volume of town gas, from its genesis in the retort to its exodus at the consumers' appliances, have come under my notice from time to time; and my inclination would lead me to give a description and criticism of some of them. But you will appreciate that the selection of a very limited number of governor types would be an extremely embarrassing matter for me as a manufacturer. I have felt all along that the proper person to read a paper on this subject is the man who buys and uses governors, and not the manufacturer. However, though for these reasons I would prefer not to be in this position to-day, yet I am deeply sensible of the honour you have done me in asking me to read this paper; and I hope that it will at least provoke some discussion.

You will remember that the immediate stimulus which gave rise to the proposal that I should deal with this subject was the reference Mr. J. F. Simpson made two years ago to an automatic station governor installed in the new gas-works at Scunthorpe. So, with your permission, I shall confine myself to automatic station governing, leading up to this with a brief historical résumé coupled with some general observations.

First Meter and Governor.

"The first meter consisted of two bladders, containing the gas, enclosed in tin cases. The bladders were weighted to a certain degree of pressure; the passage between them and the burner being alternately opened and closed by means of mercurial sealed valves." These were not successful, and "recourse was had to metallic vessels working in the same manner as the bladders, but the lights were so unsteady that the intervention of a *governor* was necessary." This combination was expensive and unwieldy, and led directly to the contrivance of the wet meter.

The first governor was patented in conjunction with a meter by Samuel Clegg in 1815. Part of Clegg's governor was nothing more or less than a small gasholder; and it was the reserve gas in the holder that neutralized the fluctuations of the meter. The contrivance consisted of a bell (or holder) and a counterbalance weight at opposite ends of a rocking beam. Nearer the centre of the beam was suspended the valve, which in this case consisted of a cup filled with liquid which sealed and unsealed a plate inside the hood; the bell rising and falling in response to the fluctuations of the meter much in the same way as the hydraulic by-pass which can still be occasionally seen in gas-works.

The use of the governor bell as a small reserve holder is now confined to small laboratory governors such as those on calorimeter supply lines. It has nothing to do with modern station governing. It is, however, an important point to note that the first governor on record made use of the principle of the reserve holder, and that long after the principle was recognized as useless for station governing it still seemed to influence governor design.

In 1825, ten years after Clegg's patent, Samuel Crossley brought out the first "diaphragm" governor. This governor had a leather diaphragm from which was suspended a single conical valve opening downwards. There is really little difference between this governor and many small diaphragm governors of the present day.

The conical valve is worthy of note, as it was the immediate forerunner of the parabolic valve which is still very popular.

Early Station Governors.

Up to about 1850 the prevailing type of station governor was just like a model gasholder with inlet and outlet pipes quite separate. The inlet pipe was at the centre, and the outlet to one side. A parabolic valve, suspended from the crown of the holder, moved up and down inside the inlet pipe, which was of ample dimensions and closed upwards against a seat fixed to the top of the pipe. Thus the whole of the gas sent out from the works actually passed through the governor bell. Such an awkward arrangement naturally meant a large bell for the accommodation of the pipes, if for nothing else.

The next move seems to have been dictated by a desire to save space, and consisted in making the inlet and outlet pipes concentric. The gas, as before, passed up the inlet pipe in the centre, through the valve, and down through the annular space between inlet and outlet pipes. The outlet pipe projected up through the water, thus forming the pressure pipe. Statically this would appear a better arrangement, as the main flow of gas in this case was not through the bell.

The idea that the governor bell could be actuated just as well by a small pressure pipe as by a pipe the full size of the main does not seem to have been made use of until after a serious accident occurred at one of the London works (Nine Elms). Here a governor bell was accidentally tilted-over by a workman. The seal blew, and before the gas could be shut off there was a serious explosion with fatal results. This event got governors a bad name. For many years they were regarded as sources of great danger; and even to-day the idea is still prevalent that the governor house is a place to be very carefully watched.

Developments.

To obviate the recurrence of such an accident, three methods were suggested and put into use. These were (1) the provision for a guide framing, so that there was no chance of tilting, even when the bell was at the top of its stroke; (2) the fitting of a tight cover over the bell, this cover provided with a hole for the protruding rod, and a funnel for water filling; and (3) the isolation of the bell from the main gas stream, the pressure connection being either a very small pipe just large enough to accommodate the valve stem with sufficient clearance, or this control pipe being sealed off altogether, and a separate pressure pipe run from the outlet side of the valve to the under surface of the bell. Personally, I consider that all governors should be totally enclosed; and this is carried out by my firm.

An interesting governor of the latter type was that invented by Charles Hunt. He rejected the idea of the conical valve, and substituted an ordinary throttle valve, using the smallest possible pipe for the double purpose of conveying the pressure to the bell and accommodating the rod actuating the valve. Even at this early date Mr. Hunt had realized that bells were as a rule far too large; his 8-in. governor having only a 12½ in. diameter bell, and his 18-in. governor a 17-in. bell.

There are one or two points about these early governors—excluding Mr. Hunt's—which are worth special emphasis. They had single unbalanced valves, with the result that any change in inlet pressure had its effect on the outlet pressure, and the only way to render that negligible was to increase the size of the bell. This gave rise to the rule of thumb that the area of the bell should be 20 times the area of the valve.

The Parabolic Valve.

The parabolic valve meant a long stroke, which in turn meant a deep seal with guide framing. Guide pulleys, especially those beneath the water line, were liable to stick. Friction was increased; and to gain power to overcome this friction, the tendency was again to increase the size of bell.

The function of the parabolic valve was, of course, to give a valve opening proportional to bell displacement. There does not seem to be much virtue in the idea from a theoretical standpoint, as a governor is an apparatus which is—or ought to be—in balance, regardless of relative openings and displacements. Its slow opening and closing possibly helped towards smoothness in action; and it certainly had the advantage that if inlet and outlet pressures were noted, and the stem graduated, the instantaneous rate of gas discharged could be estimated. This, however, is a question of metering, and not of ordinary governing, though it enters into automatic working.

Another rule—and a good rule too—observed in the manufacture of these old governors was to make the valve opening somewhat less than the area of the connected mains. If the valve passages are properly designed, the friction through them is negligible compared with that in the comparatively long lengths of inlet and outlet pipes. Governors are often improperly blamed for frictional losses for which they are not in the least responsible. Managers often insist on governor valves being of the full area of the connections. If any of you are in doubt as to this point, I would suggest that you put gauges on inlet and outlet at a time when your governor is fully open—viz., when it is not governing owing to overload. I venture to suggest you will be surprised. Under these conditions most of the pressure drop will probably be found in the holder outlet line.

The next step was the balancing of the valve so that the governor should act independently of variations in inlet pressure. The method most commonly used to-day—*i.e.*, the use of the double valves with the inlet between the seats—does not seem to have been thought of to begin with. Single valves were still retained, but the apparatus was arranged in such a way that the bell, or a portion of it, was used to balance the valve so far as inlet pressure was concerned. Some modern governors are still built in this way and work quite well, especially in the smaller sizes. In case some of you are not familiar with the idea, it might be as well briefly to explain it, taking the simplest possible case—viz., that in which the areas of both bell and valve are the same.

In this case the inlet is on the top of the valve, and a tube connects the inlet space with the underside of the bell. Thus

the underside of the bell and the top of the valve are both under inlet pressure, and, both being of the same area, are in balance whatever the variations in that pressure. The only other surfaces to be considered are the top of the bell and the underside of the valve. The top of the bell is under atmospheric—and therefore, from our point of view, constant—pressure, while the base of the valve is under outlet pressure. Any increase or decrease of this pressure will tend to raise or lower the valve, and hence effect the necessary governing. Where a more powerful control is desired, a still larger bell is placed outside the balancing bell, to which a control pipe from the outlet main is carried.

From the date of the introduction of the balanced valve, there has really been little alteration in the general design of governors. The various manufacturing firms have each developed along their own lines, but there has been no radical change. Modern governors are beautifully accurate machines; but their present-day efficiency is due more to small refinements and greater accuracy of workmanship than to any important change in principle.

The Ideal.

Now what is the actual ideal of governing? It is to maintain a constant pressure at consumers' appliances at all times and in all situations, day and night. This ideal naturally can only be realized by a constant pressure regulator placed at the inlet of each appliance. A stage further away from the ideal is the service governor. The next stage is the district governor; and the last and worst is the station governor. The larger the area served, the more ineffective does constant pressure station governing become.

Mr. Hole, in his "Distribution of Gas," says: "The great ideal constantly before the mind of the gas engineer has been to perfect some arrangement by which the governor should be automatically adjusted to meet the varying requirements of the hour whenever and to whatever extent the demand may be made." Granted station governing, it will be apparent from the very nature of the problem that the solution must be a makeshift. It being manifestly impossible to give every consumer exactly the same pressure all the time, an average must be struck which will give the greatest happiness to the greatest number. Absolute uniformity of pressure throughout the district is not really the important thing; it is constancy of pressure to each consumer, even though consumers at parts of the system remote from each other experience different average pressures. The purpose of automatic governing is to reduce variation from this average.

Take a simple case. Assume a constant pressure of 5 in. at the station governor, accompanied by a variation of 3 in. at a point 2 miles away. By that I mean that the pressure at this point is 5 in. at periods of minimum consumption, but only 2 in. at maximum consumption. Consumers along the main will have pressure variations ranging from zero near the plant to this maximum of 3 in. at the point 2 miles away. But supposing the station governor is loaded to 6¼ in. at maximum discharge, and this pressure is proportionately decreased to 5 in. at minimum discharge, the effect will be to reduce the variation at the remote point from 3 in. to 1¼ in.—*i.e.*, at minimum load it will still be 5 in., but at maximum load 3¾ in. Of course, there will now be a variation of 1¼ in. near the plant which did not obtain before, but the average pressures for the district as a whole will be better. There will be a point somewhere near the middle of the main where the variation will be *nil*. This point I call the "centre of gravity of the system;" and the function of automatic governing is to maintain a constant pressure at this centre.

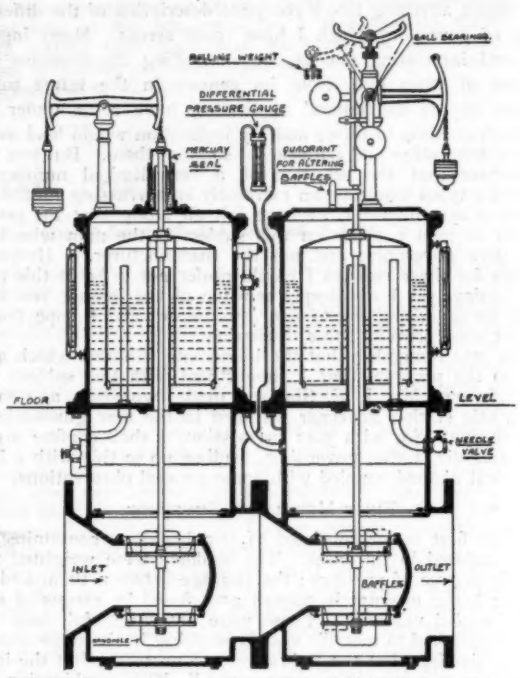
Types of Control.

This kind of governing has long been felt to be a necessity; and there are three general methods of obtaining it. There is clock control, a method which explains itself, and which involves the assumption that load depends on time. It does not deal with a sudden demand for gas such as might occur (say) in the case of a fog and the return to normal when the fog had lifted. There is long-distance control, either pneumatic or electric, wherein the station governor is controlled by the pressure at some distant point—perhaps the "centre of gravity." And there is volume control, the method in which the loading of the governor depends on the volume passing through it at any instant. This last method seems to me to be the best on most counts; and several governors are built on these lines, such as Braddock's, the "Connelly," and the "Bamag." Braddock's depends on the transference of water between the top of the bell and an auxiliary tank supported on a small auxiliary bell; the "Connelly" on the transference of mercury between a bowl on the valve stem and a surrounding annulus supported on counterbalance chains; and the "Bamag" on the moment of a rolling weight about the centre line of the stem.

A very pretty governor has also been devised which makes use of the principle of the venturi tube. The number of patents taken out in this connection is enormous—a fact which shows that a definite need for this kind of governing has been experienced.

Rolling Weight Control.

The governor which I will now describe in detail depends for its action on the moment about the valve stem of a rolling weight. It is so arranged that this moment is proportional to the displacement of the valve, being in all cases zero when the valve is at its mid position. When the valve is above the mid position, the tendency of this rolling weight is still further to



Automatic Self-Loading Station Governor.

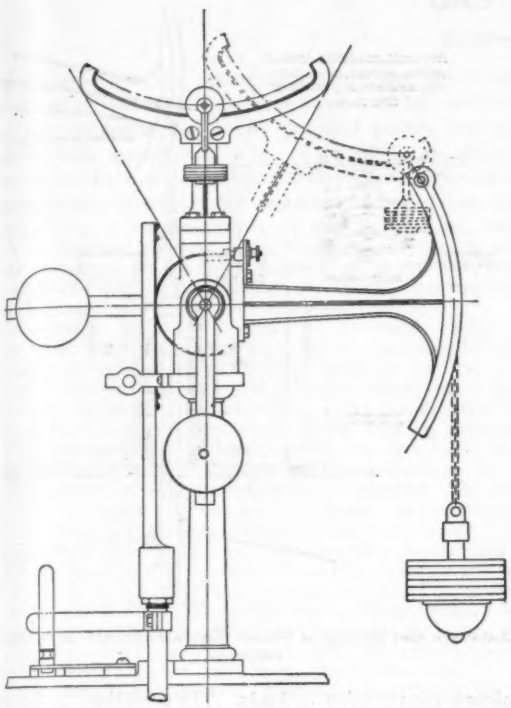
close the valve; when the valve is below the mid position, the tendency is to open it still further. This double action has an important bearing on the working of the governor, as it enables light weights to be used to obtain the desired effect.

Thus the load on the governor bell, and hence the pressure thrown by it, depends on the amount of valve opening. But it is necessary to go a stage further. In order that the valve opening should be proportional to discharge, a differential pressure—*i.e.*, the difference between the inlet and the outlet pressures across the valve—must be maintained constant. It is not enough to maintain the inlet pressure constant. Owing to the action of the rolling weight, the outlet pressure varies; and this variation affects the discharge just as much as a similar variation on the inlet. Obviously some sort of differential control must be added to the self-loading arrangement to attain the desired effect.

The governor consists of two separate but interdependent units—a differential governor and an automatic governor. The differential governor does not merit any particular attention. Constructionally it is the same as any ordinary differential governor; the only difference being the points from which the controlling pressures are taken. In the ordinary differential the points of control are inlet and outlet of its own valves; in this differential the points of control are the inlet and outlet of the other governor's (the automatic) valves.

The bell and double-seated valve of the automatic governor are of ordinary standard design; the bell being sealed off by a dip pipe from direct pressure from the top of the valve. The pressure pipe is taken from a point on the outlet clear of eddies, and a needle valve is inserted for damping purposes. There are no guides in the ordinary sense of the term. The valve stem, bell, and valve hang free from a suspension arc. The suspension arc is supported on ball bearings, and carries with it the counterbalance arm and the automatic arm. The arc is connected to the stem by rustless steel tapes in such a way as to transmit both tension and thrust to the axis of the spindle, resulting in a definite angular displacement of the arc and connected arms obtained without friction.

The counterbalance arm is the usual tangent device necessary in all floatless governors. The automatic arm carries a curved rail on which the weight carriage rolls. It is itself counterbalanced so that when the carriage is removed the pressure thrown by the governor in all positions is constant. Thus the apparatus can be immediately converted into an ordinary static governor by the mere removal of the carriage. The shape of the automatic curve is not very easy to describe. I am not aware that it is any of the known mathematical curves. Its peculiarity is that in any position within its range the horizontal distance of the lowest point of the curve from the axis



Arrangement of Automatic Arm and Connection to Governor Stem by Frictionless, Rustless, Steel Tapes.

of the spindle is proportional to the angle through which the arm has rotated from the vertical. The carriage naturally takes up this lowest position, thus giving the required moment about the vertical axis of the spindle without overrunning.

LOADING OF THE GOVERNOR.

The actual loading of the governor is done in this way: First, the drop in pressure between the station governor and the centre of gravity of the system is noted at the period of maximum consumption. The average pressure required at the centre of gravity being determined, the station governor is loaded for the fixed pressure *plus* half the drop at maximum consumption. Weights corresponding to the remaining half of the drop (including weight of carriage) are then placed upon the automatic curved rail. Here I would remind you that the effect of the automatic arm at its mid position is *nil*. When the valve is above mid position the tendency of the automatic arm is to unload the governor; below mid position to load it.

As before, let me illustrate with a simple example. Suppose the required average pressure at the centre of gravity is 4½ in., then the pressure drop at maximum demand having been noted at 1½ in., the governor would be loaded thus: First load it to 4½ in. *plus* ¾ in. = 5¼ in. Then add automatic load ¾ in. (half-pressure drop). The effect of this on station and pressures at centre of gravity would be:

—	Station.	C. of G.	Pressure Drop.
Full load	6 in.	4½ in.	1½ in.
Mean	5¼ ,,	4½ ,,	¾ ,,
No load	4½ ,,	4½ ,,	0 ,,

SEASONAL VARIATION.

In addition to the daily variation in load, there is also the seasonal variation to be allowed for. The method adopted to deal with this is very simple. The valve carries a cylinder with vertical slots, this cylinder working within a similar cylinder fixed to the seat. When opposing pairs of slots are in line, the valve opening is at a maximum; and this opening is reduced by the simple expedient of turning the valve stem. A pointer and graduated arc are fitted on the top of the tank to indicate the relative positions of the fixed and moving slots. It is important to note that either governor can at any time be immediately used as an ordinary station governor; the other being put out of action.

One benefit is worthy of mention as the result of the construction of this governor—viz., that once set for a definite range of pressures over certain consumptions, it cannot pass more gas than the maximum for which it is set. The advantage is that an accident—say, a broken trunk main—will not result in such a large loss of gas as under the usual conditions. Unexpected, though legitimate, overloads could be met in the original setting of the pressure range by allowing for normal working over (say) three-quarters of the stroke, leaving the remaining quarter to provide for exceptional overloads.

The second consequence is due to the fact that outlet pressures are proportional to the rate of discharge. This means that pressure charts can be graduated in terms of cubic feet per hour, and can also be integrated to give the send-out over

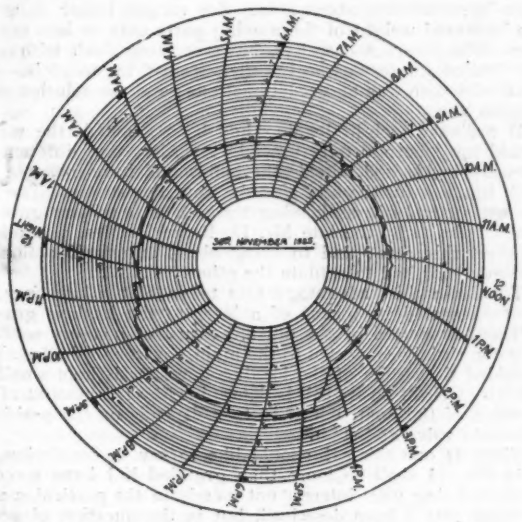


Chart at Outlet of Station Governor.

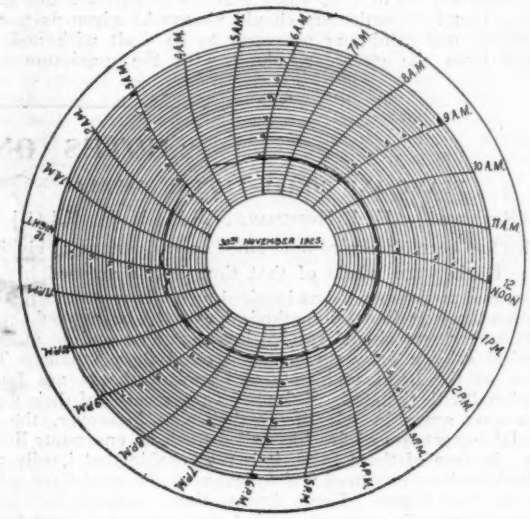
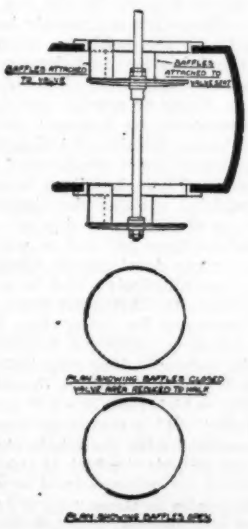


Chart from District over Three Miles from Station Governor.

any required extended period. It is not suggested that the accuracy of an integration method like this is of the same order as that of (say) the venturi meter; and it could never be used for the same functions. Its chief values would seem to


BAFFLES ATTACHED TO SEAT
BAFFLES ATTACHED TO VALVE SPINDLE
PLAN SHOWING BAFFLES CLOSED VALVE AREA REDUCED TO HALF
PLAN SHOWING BAFFLES OPEN

Baffles.

lie in recording the times and values of peak loads, thus assisting in the working of holders and stand-by manufacturing plants.

AN EXCEPTIONAL CASE.

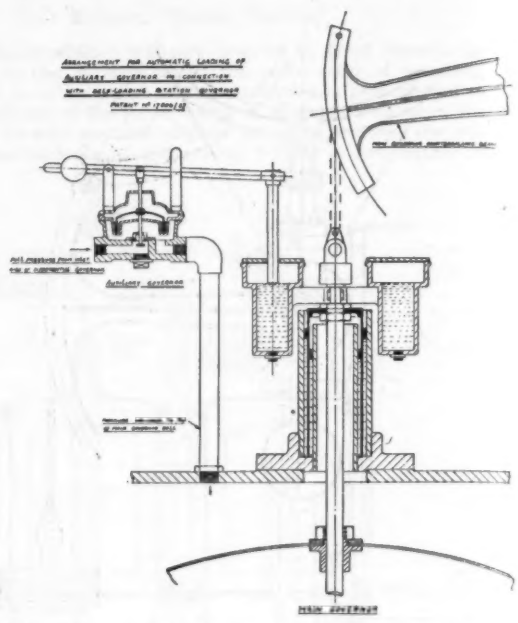
The limiting pressure range for a governor built on these lines is somewhere about 6 in. For ranges larger than this, the increased weight of the moving parts gets us into momentum difficulties. A case has, however, been dealt with where the desired range was 30 in.—*i.e.*, from 6 in. to 36 in. This particular case was an exceptional one; and the solution might interest you.

If ordinary weight loading had been adopted, the weights would have been utterly unwieldy. Also the difference in pressure inside and outside the bell would have meant a deep tank to allow for the seal *plus* the governor stroke. The well-known method of gas loading through an auxiliary governor, first employed by the late Mr. D. Bruce Peebles, was adopted to meet this case; and to bring about automatic action, the one governor had to actuate the other.

To obtain this, advantage was taken of the buoyancy of a float connected by means of a lever to the loading governor bell and supported by the upward thrust of mercury contained in a cup rigidly connected to the main governor spindle. Thus, provided the stroke of the loading governor is kept small, the effective weight on its bell is determined by the amount of submersion of the float, which in turn depends on the position of the main valve and stem.

There is one thing I should like to say in conclusion, and it is this. I shall be more than gratified if I have succeeded in stimulating your interest not merely in the particular pieces of apparatus I have described, but in the question of governing as a whole. It is a fascinating subject and has endless ramifications.

I would appeal to you, when making inquiries about governors, that full particulars should always be given as to the maximum and minimum pressures to be dealt with and required from the governor, along with the maximum and minimum consumption or loads. The conditions to-day are so complicated that it is only by the closest co-operation between manufacturer and user that the best results can be obtained.



Automatic Gas Loading of Station Governor through an Auxiliary Governor.

NOTES ON NEW BOOKS.

FLAME AND COMBUSTION IN GASES.*

[Reviewed by H. J. HODSMAN, M.B.E., M.Sc., F.I.C.]

Fire has been known to man since an early stage of civilization. During the whole of that time it has aroused his interest, and sometimes it has inspired awe. It was natural that as soon as experimental methods began to be applied, combustion processes should receive investigation; and so modern chemical science grew up largely around these studies. The names of the great architects of chemical theory are found associated with the study of fire; and the records of their work fill a vast space in scientific periodicals. Moreover, the industrial importance of fire has called forth an enormous literature. In face of these facts, it is remarkable that hardly any books have been produced which deal with the specialized scientific study of flames. From time to time, rumours have been heard of books in preparation; but these have not been forthcoming. In the circumstances named, there can be no doubt of the welcome awaiting a worthy book on this subject.

The one before us is a substantial volume running to 550 pages. It can readily be understood that, if comprehensive, such a book must be large, and yet the authors have to disclaim the pretence that it is all-inclusive.

It begins with seven historical chapters which trace the growth of ideas in combustion in the era of modern experimental chemistry. These are not merely interesting, but valuable to all students of the subject. Eleven chapters follow which deal with the initiation and development of flame and detonation in gaseous explosions. The phenomena attending ignition, whether by flame or sparks, are dealt with at length, as befits their importance to industry and especially to the safety of mine workers. Limits of inflammability receive one chapter, and two more chapters are devoted to the initial phases of flame propagation. There has been a revival of interest in these subjects, which, assisted by improved experimental technique, has led to the accumulation of much new information, which the authors have collated or mentioned.

It is always a welcome development when science finds itself able to generalize quantitatively; and in a field where this is difficult and dangerous, two attempts attract attention. These are the methods proposed for calculating limits of inflammability of complex mixtures, from the limits of simple mixtures, and for making the corresponding calculations of flame speeds. In the chapter on limits, the authors devote a few lines to Le Chatelier's equation, which they think "may pass muster as a useful empirical rule." This treatment seems meagre and unbalanced when compared with the whole chapter on the "Supposed Law of Flame Speeds," which is subjected to destructive fire of experimental artillery of large calibre. For a purely negative discussion, this allocation of space seems excessive.

Detonation phenomena receive two chapters; and then follow two more on the structure and properties of stationary flames—matters of great interest to readers of the "JOURNAL." The older work and the observations of Smithells and his associates on the Bunsen flame are reproduced at length, illustrated by beautiful plates.

The treatment of flame temperature does not look generous, and the use of the "chemical thermometer" by Le Chatelier, Haber, and his collaborators is not mentioned. The radiation from flames, which is receiving renewed attention, gets a whole chapter which may need elaboration if a second edition is called for.

Section III., of five chapters, deals with explosions in closed vessels. This includes the study of the internal combustion engine, the determination of specific heats, and much recent work on the explosions at high pressures to which the authors have largely contributed. The chapter on "knock" phenomena in engine cylinders will be of use in bringing the various ideas current to a focus.

Section IV. is devoted to the mechanism of gaseous combustion, and includes the study of the influence of water, the mode of attack of oxygen on carbon and hydrocarbons, and the thermal decomposition of hydrocarbons. It is essentially the story of experimental work mainly carried out in this country.

The last section covers the subject of catalytic and incandescent surface combustion. The name of Bone is intimately associated with this topic, but an account is given of the history of the subject and of modern theories of surface catalysis—some of which the authors are not prepared to swallow whole. The early promise of surface combustion has hardly been realized in industry, but there are signs that a future still awaits the application of this method of gaseous combustion.

The work of Bone and his associates forms a substantial part of the last three sections of the book. On looking them through, one feels that this can be justified by the substantial amount of patient experimental work of a high order, spread over a generation, which they have carried out. The work of others is, however, freely discussed or mentioned either in the bibliographic lists or in the tables of physical and chemical data at the end, reproduced from the "International Critical Tables."

The need for, and scope of, a treatise of this type have been indicated at the outset. It may be inferred from what has been said above that the authors can fairly claim to have substantially filled the gap. The book is packed with information, and will undoubtedly be regarded as the standard work of reference in this field. It contains numerous plates of beautiful photographs of flames, and is altogether a creditable example of the publishers' craft.

* "Flame and Combustion in Gases," by W. A. Bone and D. T. A. Townend. Published by Longmans, Green, & Co., Ltd., 1927; pp. xvi, and 548. Price 32s. net.

GAS BLENDING.

By NORTON H. HUMPHRYS.

The promoters of the recent meeting of the North British Association of Gas Managers have reason to feel satisfied at being able to secure two sound practical papers dealing respectively with quality and prices of gas—both, in the fullest sense, topics of the day, and capable of attracting interest over a circle greatly exceeding that represented by the Association. In submitting a few comments on the first subject, from a South of England point of view, there is every desire to encourage progress on the lines followed by the author, and to appreciate the careful, painstaking, and methodical manner by which his information has been obtained.

The writer is specially interested in the recommendation in favour of accurate and direct methods as preferable to rough-and-ready inferential tests, having some thirty years ago adopted a system that included periodical analyses of gases. Many who are inclined to follow this advice are debarred from doing so by the objection of sharp money-making directors to anything beyond a trifling outlay on laboratory apparatus, and strong hints that their time might be more advantageously employed by attention to immediate business matters. The results were always checked by the specific gravity as ascertained by means of Wright's effusion test, and by the calorimeter. There is some slight discrepancy in each case, due to the fact that neither the specific gravity nor the calorific value of the heavy hydrocarbons is definitely known; but as applied to gases not exceeding 500 B.Th.U. in calorific value, the discrepancy is not of great moment if the working conditions are the same. Over a period covering several years, satisfactory results were obtained on straight, blue, carburetted, or mixed gases.

The favourable conditions at Ardrossan may excite the envy of engineers less fortunately situated. A plant of excessive dimensions throughout, a supply of coal averaging 35 p.ct. of volatile matter and less than 4 p.ct. of ash, delivered on the works at 20s. per ton, and coke saleable at 25s. per ton, or of superior quality either for retort furnace or cupola, do not improve the prospect for running a blue gas plant or manufacturing a mixed gas at a lower cost per therm than a straight coal gas. The common inducements of an expensive coal and a bad coke market are both absent.

One of the reasons why a relief holder is generally accepted as a necessary appendage to a cupola gas plant is the desirability of securing a steady and regular production of gas, one hour with another, through the condensers and purifiers. The necessity is not so acute if both are capable of dealing with larger quantities of gas than are represented by the maximum rate of production. But sometimes the plant is not capable of efficiently dealing with more than the steady production common to straight coal gas only. The velocity of the current of gas at the condenser inlet may vary from a ratio of one during the blow to two at the maximum peak production during the run. If the working capacity of the exhauster is equal to the strain, the automatic regulator is not always sufficiently sensitive to be capable of adjusting itself to such wide variations, and at the same time maintaining a level gauge on the hydraulic main. And unless the purifiers are of ample capacity, they cannot be worked to the same advantage on a fluctuating as on a steady production.

A second reason is the need for securing a practically perfect mixture at the holder outlet. A large plant means a slow velocity; and possibly the travel of any one particular particle, from the time of production until it enters the gasholder, occupies more than one hour. And if the holder is also large, a further long interval elapses before it goes out into the district. Under less favourable conditions, the chances of securing complete mixing are not so good. If a small holder is available, and can be spared, so much the better; but if a new one must be provided, the possibility of dispensing with the relief holder becomes an important consideration.

The volatile content of the coal, the temperature in the combustion chamber, the yield, and the composition of the gas as revealed by the analysis, all suggest that by working at higher temperatures a much larger yield, both of cubic feet and of therms, could be secured without exceeding the 15 p.ct. of inerts in the gas that Mr. Sturrock regards as a low percentage. At the same time, the calorific value per c.ft. would be reduced. A make of 10,000 c.ft. of 560 B.Th.U. gas—only 56 therms per ton—is scarcely consistent with modern working and material of the quality described. The analysis of the gas recalls the qualities usually manufactured some 40 years ago, before the introduction of gaseous fuel in the retort house, and under the illuminating power standard. A rather high moisture content brings the total non-combustible content of the coal up to an average of 9 p.ct.; but many in the South of England would be thankful if a regular supply of 9½ p.ct. purity could be assured.

The destructive distillation of coal secures the separation of the volatile content, in the form of either permanent gas or condensable vapour. A small allowance must be made for gases retained by the coke, and the deposition of solid carbon, which account for the fact that the yield of coke is usually more than might be expected from the results of a proximate analysis. The permanent gas is slightly reduced by the removal of impurities in the washers and purifiers, before it reaches the works meter. These losses, taken together, do not exceed 5 or 6 p.ct. of the total. The weight of gas, in the days of "straight," was commonly assumed to be one-sixth of the weight of the coal. One ton of coal would yield about 370 lbs. of gas. A volatile content of 35 p.ct. means 784 lbs. per ton; but calculation of the specific gravity of the gas from the analysis gives a figure of 0·380, and the weight of 10,000 c.ft. would not be more than 290 lbs. The tar, taken at a specific gravity of 1·2, will weigh 140 lbs., leaving 354 lbs. to be accounted for by the ammoniacal liquor and the losses above named.

Gas engineers are accustomed to attach much importance to the volatile content of a coal. Yet here is a sample giving a substantially higher content than average English gas coal, but poorer results in practice. It suggests that the methods of reducing calorific value as set forth in the paper might be supplemented by the now very common practice of working with a combustion chamber temperature of 1350° to 1400° C., equivalent to about 2500° Fahr., which would secure a larger yield of gas, a lower calorific value, and, to a proportionate extent, the advantages of a reduction in the tonnage of coal that must be handled and a smaller quantity of coke that must be sold. Many coals less promising in character are caused to produce 12,000 c.ft., or about 60 therms per ton carbonized; and on a basis of 20s. per ton, the cost delivered into the holder is nearer 1s. 6d. per 1000 c.ft. than the 2s. 1d. quoted in the paper.

Apparently the Ardrossan Corporation have accepted, or are about to accept, the Gas Regulation Act, 1920, and a declared value of 440 B.Th.U. Sometimes there is difficulty in following the reasoning that has led up to the fixing of the declared value, or in reconciling the decision with known local circumstances. Such was not the case at Ardrossan, as Mr. Sturrock has evidently worked-out his figure on an all-round basis. The capacity of the mains, services, consumers' interior piping, and the available supply pressures, are more important in this connection than is generally recognized.

The latest published price of gas at Ardrossan is 5s. 2½d. per 1000 c.ft., equivalent to 11d. per therm, on the basis of 560 B.Th.U. value. The Board of Trade will probably expect the therm value to be maintained; and if this is correct, the mixed gas will be sold at about 4s. per 1000 c.ft. Therefore the saving in terms of 1000 c.ft., apparently much greater than when stated in therms, is heavily discounted. When making an important reduction in calorific value, the 1000 c.ft. basis is preferable to the therm, from the seller's point of view. It affords him some chance of sharing in the saving obtained by reduced manufacturing costs; whereas the therm has the effect of passing on the whole, lock, stock, and barrel, to the consumers.

A serious difficulty common to all processes that include decomposition of coke and steam, whether in the retort or by a separate plant, is the excessive quantity of carbon dioxide in the purified gas. The same applies to all internal combustion processes. A small quantity can be taken out by liberal washing and scrubbing, either with weak ammoniacal liquor or clean water; but beyond that, no practical means of reducing below 2 p.ct. or so are known. Its objectionable properties as a corrosive agent on metals, and deleterious effects on flame temperatures, have been demonstrated over and over again; and a specific gravity of 1·53 is an objection. Experience has shown that the cost of meter repairs, loss due to slow or stopped meters, and service renewals, to say nothing of gasholders and purifier covers, will be substantially greater with a gas averaging 7 p.ct. of carbon dioxide, than with another that does not exceed 3·2. Many of the troubles that one hears of or experiences in these days were not known in times when the gas contained 4 or 5 p.ct. of heavy hydrocarbons, not more than 2 p.ct. of carbon dioxide, and a mere trifle of oxygen.

The only incombustible constituent possessing a genuine claim to the title of "inert" is nitrogen; the objection being limited to a specific gravity only slightly less than that of air. Regarded as a simple diluent, it is an inoffensive agent for reducing calorific values to the lower standards that are now to some extent in fashion. As much cannot be said on behalf of carbon dioxide or oxygen.

Sixth National Cost Conference.—In the Connaught Rooms, Great Queen Street, London, W.C., on Friday, Oct. 21, will be held the sixth national cost conference under the auspices of the Institute of Cost and Works Accountants. There will be a morning session at 10.30, and an afternoon session at 2.30—the President of the Institute (Mr. W. Howard Hazell, J.P.) in the chair. At the former the question for consideration will be "How Cost Accounting Reduces Costs;" and at the latter, "The Problem of the Half-Filled Shop." The afternoon session will be followed by the annual dinner of the Institute.

INSERTING LARGE VALVES IN MAINS UNDER PRESSURE.

Illustrations of the Ruscoe Process.

The accompanying photographs, which have been sent to us by Mr. Hubert Pooley, M.Inst.C.E., the Engineer and Manager of the City of Leicester Gas Department, give a good idea of the method adopted by Messrs. Ruscoe & Co., of Hyde, for inserting 24-in. and 16-in. valves in mains under gasholder pressure and while at work.

Fig. 1 depicts the gear in position, ready for cutting the 24-in. main; and fig. 2 shows the first part of the large surrounding cast-iron box into which the cut is to be drawn, and through which the valve is finally inserted.

To facilitate these processes, a gas-tight slide is inserted, the position of which is clearly shown in fig. 2, from which can also be seen the hand-holds through which most of the bolts can be applied to the flanges of the valve.

Fig. 3 shows the whole of the larger box into which the cut is drawn, and explains how the valve is put into adjustment with the pipe.

Fig. 4 depicts the valve being put into the box; while fig. 5 is a photograph of the finished work.

The photographs in figs. 6 and 7 show a somewhat similar process applied to a 16-in. main; and the final photograph, fig. 8, is of the pieces cut out of the mains—the piece on the right of the photograph being, of course, from the 24-in. main.

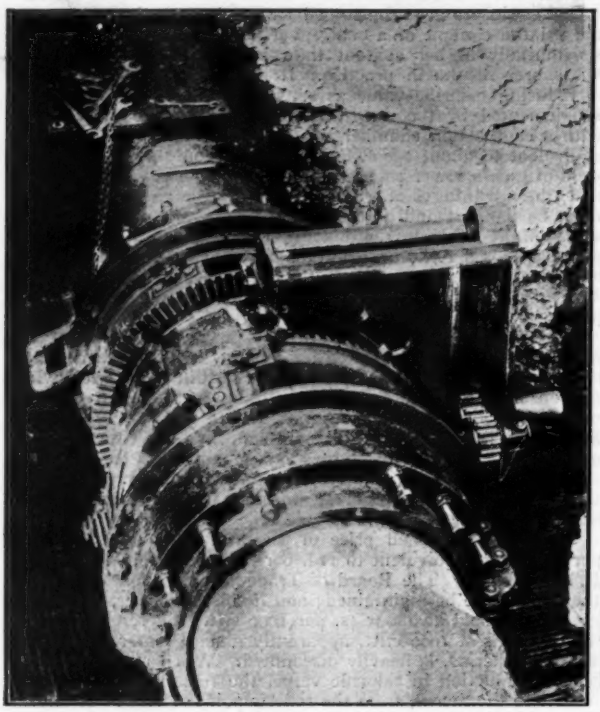


Fig. 1.

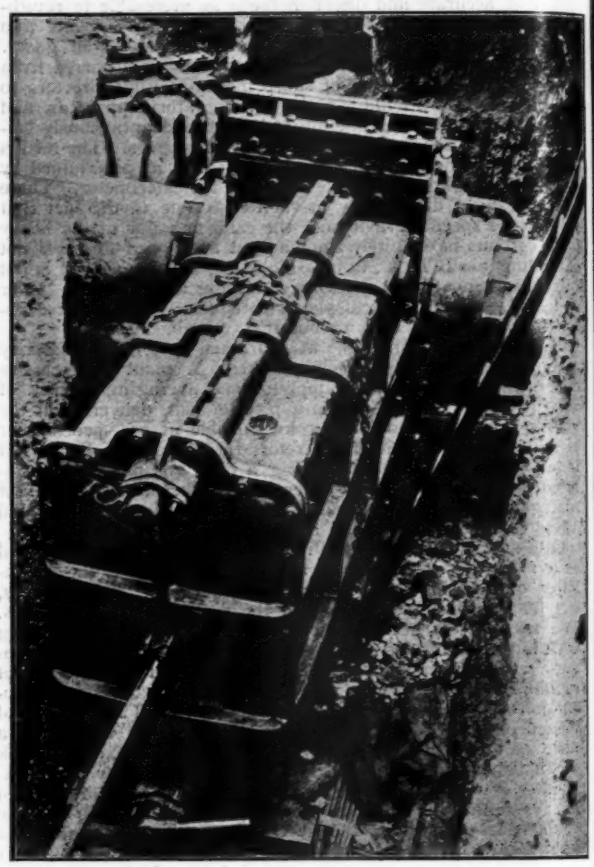


Fig. 3.

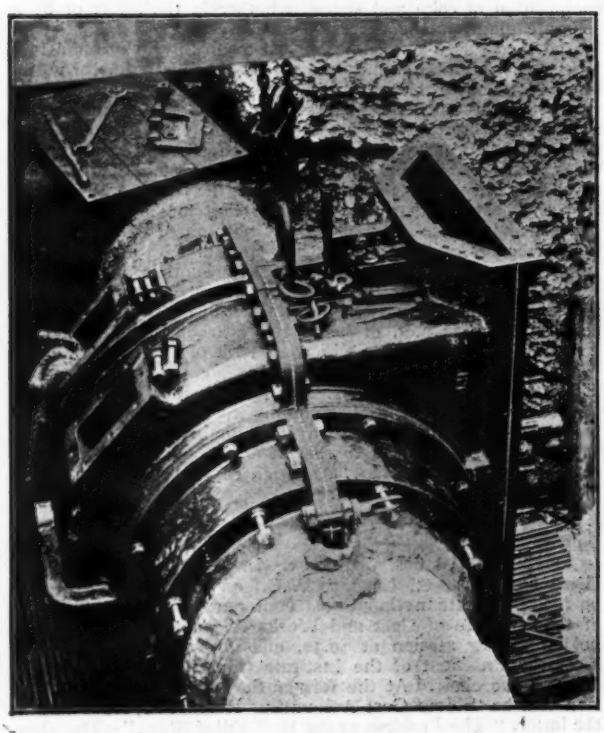


Fig. 2.

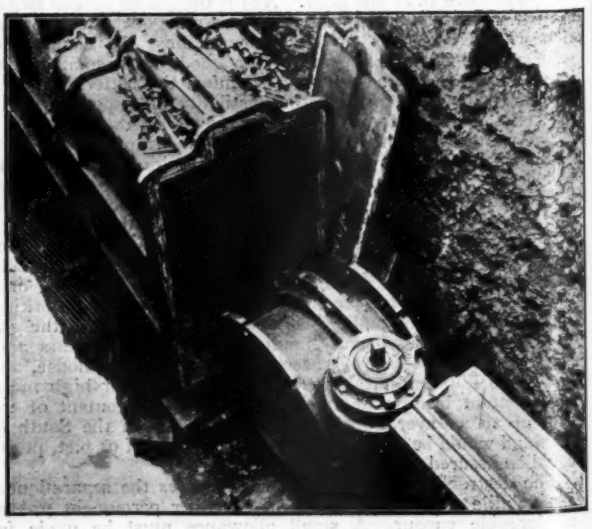


Fig. 4.

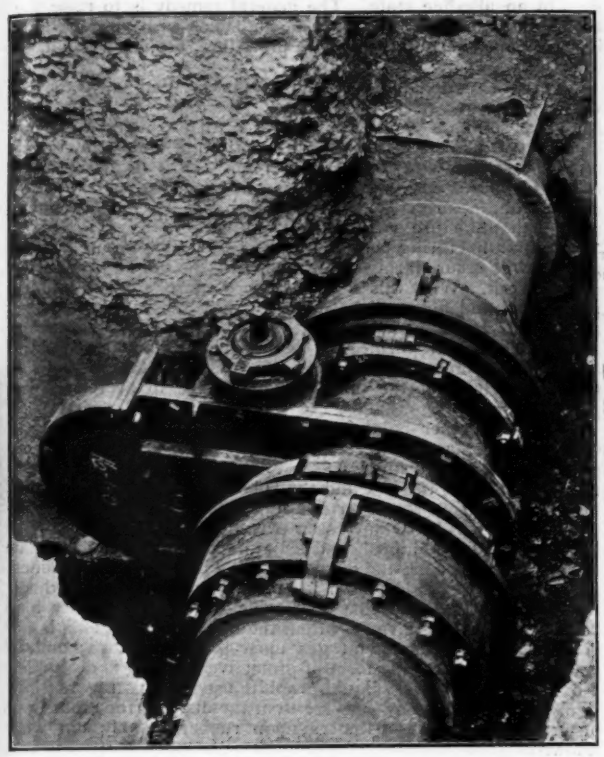


Fig. 5.

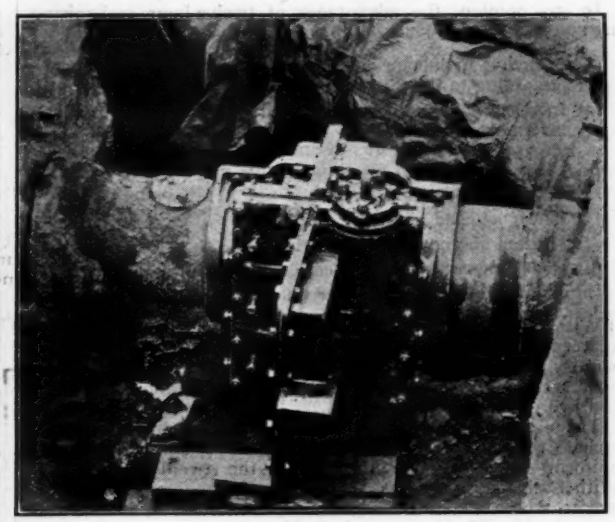


Fig 5.

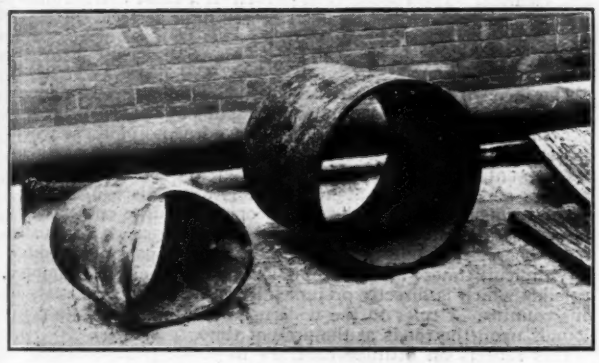


Fig. 8.

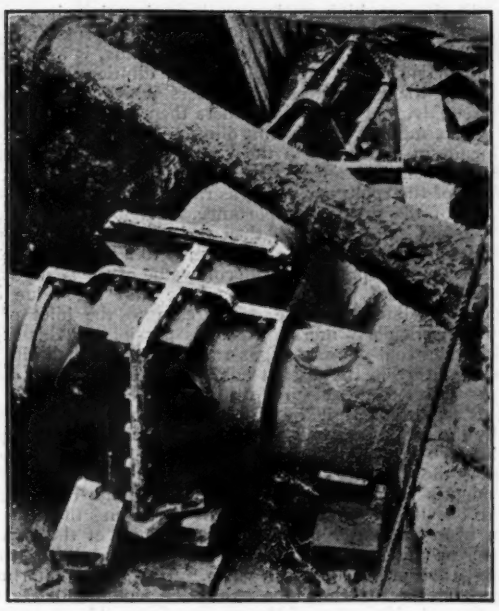


Fig. 7.

PRESENT-DAY PROBLEMS.

By T. ANTHONY CANNING, F.C.S., of Woking.

[A Paper before the Wales and Monmouthshire District Institution of Gas Engineers and Managers, Sept. 22.]

It is my intention within the scope of this paper to detail a few and varied points anent gas-works practice in keeping with the title. Therefore, with this object in view, I have collected some notes, and intend in the time at my disposal to detail them, in the hope that they may at least prove interesting, if not a profitable basis for discussion.

EIGHT AND TWELVE HOUR SYSTEMS OF CARBONIZATION.

Considerable difference of opinion appears to exist as to the respective merits of the two main systems of horizontal retorting at present extensively employed—namely, the eight and twelve hour cycles. It would seem to be in the best interests of the gas industry that this subject should be thoroughly investigated, and a comparison made of the respective values of each system. In order that this comparison should be a fair and equitable one, it is essential that the test should be made under similar conditions, which, broadly speaking, means that the same unit of retort benches and the same coal (or mixture of coals) should be used for each test. In this regard a difficulty is encountered which appears almost insuperable—namely, that it is impracticable to design a horizontal retort setting which will efficiently deal with both eight and twelve hour charges. The heavier charge under the twelve-hour system demands a retort of larger section and, generally, of greater length. Hence a comparison test must almost certainly be detrimental to one or other of the systems, according to which cycle the horizontal unit is better adapted.

The eight-hour system is unquestionably the older; and it is very probable that the first experiments on twelve-hour charging were conducted in eight-hour settings. Therefore, it would possibly meet the case if the comparison was made on eight-hour settings, as I am confident that, even under these conditions, the twelve-hour charge would emerge as the better system. Assuming the anticipation to be correct, then we can be doubly assured of an even finer performance in settings built to accommodate the peculiar conditions imposed by the twelve-hour charge.

I have not had the opportunity of making such a comparison under the conditions indicated; but I have worked both systems, and have reached certain conclusions which are, to a great extent, confirmed by the experience of others.

In my opinion, the advantages of twelve-hour carbonizing are:

(1) A saving in labour charges varying from 25 to 33 p.ct., according to the manner in which the shifts are arranged.
(2) Increase in make per ton without a corresponding loss in average calorific value. Hence the thermal yield is increased.
(3) Less wear and tear on retorts due to less frequent machine operation.
(4) Fewer stopped pipes.
(5) Marked absence of retort carbon.
(6) Reduced percentage of breeze in coke.
(7) Thinner tar, but of greater quantity.

With regard to producer fuel consumption, I cannot find any appreciable difference in the percentage of fuel consumed under each system. I am also of the opinion that, under the twelve-hour system, less naphthalene is produced, but more ammonia and hydrogen.

The eight-hour system certainly has its advantages, which include the very desirable factor of yielding a make of fairly uniform calorific value throughout the twenty-four hours. With twelve-hour charges, this is not the case, except on large works, where the shifts on various units can be so arranged as to render possible this most desirable end.

Dilution of High-Grade Gas.

The dilution of high-grade gas in order that it may be dispensed to the district at a calorific value approximating as closely as possible to the declared calorific value, is a matter of prime importance. In my opinion, this dilution should take place before the gas enters the holders which are ordinarily used for supply, and not in the holders themselves.

The staple method of effecting dilution in horizontal practice is by means of water gas in the "blue" or carburetted state, according to circumstances. It is therefore obvious that the regulation of the coal gas-water gas ratio passing to the district holders is of the greatest importance. Given a water gas of fairly constant calorific value, then the control of the quantity of this gas admitted to the main stream is to a very great extent dependent upon the prevailing calorific value of the coal gas and the volume thereof passing. It is here that the value of a recording calorimeter on the gas stream to the inlet of the holders is particularly marked, as it is possible by this means to control the coal gas-water gas ratio within such limits that the final mixture in the district holders approximates as closely as is practicable to the declared calorific value.

In this regard, there is a great deal to be said for the system whereby the coal gas exhauster draws upon the water gas plant relief holder—the water gas passing through a rotary meter on its way to the coal gas stream, in order that its volume may be independently measured. It has occurred to me that delicacy of control could be better achieved by arranging that the connection from the water gas main to the inlet of the coal gas exhauster should consist of a series of service pipes of a suitable diameter, each provided with a valve. A recording calorimeter arranged on the outlet of the exhauster would indicate at a glance the calorific value of the gas passing. The quantity of water gas admitted would be controlled by opening or closing valves on the supply pipes as and when required. Needless to say, a relief holder of ample capacity, in order to bank-up surplus water gas during the periods in which little is required, is a great asset. The passing of the two gases through a common exhauster achieves a fineness of mixture which, I venture to say, is impossible under any other system.

In cases where dilution takes place in the supply holders themselves, the procedure is generally attended by a fair measure of success. During the periods of maximum output, however, gas entering the holder is liable to pass direct to the district—particularly when the inlet and outlet pipes are arranged adjacent to one another. Assuming that this gas entering the holder is not of the declared value, then undesirable results are produced by its passing to the district—whether it is above or below standard calorific value does not affect the case to any marked degree. The mixing of gases in a holder is a very uncertain method of regulating calorific value, inasmuch as diffusion is slow, particularly in the case where "neat" water gas is pumped into a holder containing coal gas. Concrete evidence is available that the water gas, by reason of its higher specific gravity, lies at the bottom of the holder upon the surface of the water. In the event of the holder being placed upon the district before complete diffusion has taken place, considerable trouble may be caused by low-grade gas passing to the district. Hence careful control of the quality of gas entering the holders is essential. If this is regulated as it should be, then the quality of gas leaving the holder will more or less look after itself. It is almost as objectionable to send out gas above the declared value as below it.

Purification.

In cases where water gas is purified in separate boxes considerable difficulty is experienced at times in keeping the purifiers in an alkaline state. The general remedy is to raise the covers and well spray the oxide in the boxes with liquor. This is a very laborious and expensive procedure, besides being most undesirable.

Where the sulphate of ammonia plant is adjacent to the water gas exhausters, the remedy is simple. A connection from the sulphate plant ammonia still to the inlet of the exhauster will generally meet the difficulty, and ammonia can be passed forward with the gas as required. This, of course, refers to works where practically continuous sulphate of ammonia manufacture is in operation. In those cases where intermittent manufacture is the rule, if the purifiers are well treated during manufacturing periods it will generally be found that no trouble will occur during the time when the sulphate plant is not at work. With this method of procedure, total alkalinity is assured, and not, as in the case of liquor spraying, surface alkalinity. In cases where water gas goes forward with coal gas to a common purification plant, these difficulties do not arise, as the admission of a small percentage of NH_3 in the coal gas at the inlet of the purifiers will suffice to overcome the problem.

There is another point in connection with purification that occurs to one, and that refers to the rubber joint on luteless purifiers. It is well known that, to ensure a sound joint, both the faced curb of the box and the rubber joint must be scrupulously clean before the cover is lowered into position and bolted down. When rubbers have seen extended service, a good joint is not so readily obtained, and leaks make their appearance at various points around the outside of the joint. If one examines a rubber joint that has been in commission for any length of time, it will be found that the inside face of the rubber has deteriorated far more rapidly than the outside face. This is no doubt due to the action of gas upon the inside face; and it would appear that some form of protective covering is desirable. I have seen grease and liquid graphite used in this regard; but to my mind the remedy is worse than the disease, for the action of grease and oily substances upon rubber is only too well known.

The most effective preparation of which I have had experience is common black boot polish lightly applied to the whole of the rubber joint and the cast-iron curb, after they have been well cleaned. The rubber is preserved in a most extraordinary manner, while the joint obtained is well-nigh perfect.

Tar.

The inconsistency of those responsible for the government of this country is a matter for wonderment; and it seems to me that the same inconsistency which pervades the political world has been carried, in a great many cases, into the ranks of local government. The continual admonition to support British industries and stimulate national trade is often disregarded in a most obvious manner by the very people who urge one to carry out these patriotic and laudable ideals. The great coal industry—the bedrock of our national prosperity—is passing through very difficult times; and yet some local authorities have adopted a policy which is directly prejudicial to coal mining interests in this country. I refer to the wide use of bitumen and its compounds upon the roads at the present time.

This reflects an attitude contrary to public policy; and it is incomprehensible that such a state of affairs should exist. I say, without fear of contradiction, that it is a matter gravely prejudicial, not only to the coal industry, but to the interests of the country generally. I cannot honestly believe that those responsible are adopting this policy with their eyes open and with a knowledge of the grave consequences involved. They cannot realize that every barrel of tar used on the roads takes 4 tons of British coal to produce it; otherwise it is beyond comprehension that British money is being exploited abroad in this manner while our coal industry is financially embarrassed and rife with unemployment. The time is over-ripe for the realization of this danger and the grave national issues involved; and the local authorities in question should fall into line with their wiser brothers who realize that the utilization of British goods and labour is the only bulwark against national disaster.

Barrels or Tank Wagons.

While on the subject of tar, a short reference to a source of continual trouble might not be inappropriate. This trouble is confined to an apparently small item—namely, the barrels—but, viewed from a financial standpoint, perhaps this item is not so small as is usually supposed.

Generally speaking, once barrels leave the works all control over their treatment and care is relinquished, and unending trouble and expense are caused by the manner in which they are handled. In almost every case "skids" are provided for their proper removal from the haulage wagon to the tarring site; but apparently these are little used, for, judging by the appearance of returned barrels, they must be dropped bodily from the lorry upon the road. This is certainly avoidable, and should not be tolerated. There is another source of damage to barrels, however, for which one cannot wholly blame those responsible for the road tarring operations. I refer to the holes driven (generally by a pick) in the butt-end of barrels, in order that the tar may flow freely from the bung-hole. In cases where tar has

thickened in the barrels, it is certainly hopeless to expect its removal in a reasonable period of time without the adoption of this procedure.

These points inevitably lead one to the conclusion that the barrel system has outgrown its usefulness, and that, with tar made to Road Board specification, something more modern is a necessity. Steel drums with special plugs to prevent air-locking present a partial solution to the problem; but it is doubtful whether they would receive any better treatment than their predecessors. Besides, expense is a factor against their use.

I cannot help feeling that the true solution of the difficulty lies in the utilization of road tank wagons, by which means tar could be rapidly transported to the site of operations in bulk. Intermediate handling would be entirely obviated, as tar would be run direct from the dehydration plant into the road tank wagon, and delivered, still warm, to the tarring site. For economical, easy, and rapid handling the method would be hard to improve upon; while the filling of barrels, with its attendant expense and unpleasant conditions, would be a relic of the past.

COKE.

There seems little doubt that the future of our coke market lies with the domestic consumer. The domestic market, cultivated and extended by judicious propaganda and the supply of good quality coke, is incalculably more valuable to us than the export outlet, with its uncertain prices and fluctuating demand.

Water gas is certainly an exceedingly valuable adjunct to gas manufacture, and should be treated as such; but it should never be allowed to become the general instrument for the alleviation of a coke glut. There are certainly cases—particularly in colliery districts—where the management is compelled, by force of circumstances, to utilize practically the whole of its surplus coke in the manufacture of water gas. In these instances, it is a commercial proposition for the simple fact that the coke is worth more as gas than as solid fuel competing in the open market. In this matter, it is for every gas undertaking to study its own special and peculiar circumstances; but even that does not alter or detract from the fact that our coke market must be stimulated and expanded in every possible way.

The first absolute essential to the successful sale of an article is that it must be the right one. It is sheer waste of time endeavouring to push the sale of an article that is not fitted to undertake the duties for which it is manufactured and advertised. It is certainly true that at the beginning sales may develop; but they will never be maintained, still less expanded, because the true essential of successful sales propagation is absent—namely, recommendation. It is little realized that recommendation is a more powerful agent than advertisement, and that therefore, though the foundation of a successful market is built on the supply of the right article, fostered by correct advertisement, the expansion and development of that market is more often achieved by recommendation.

Hence our premier consideration is to ensure that we have the right article; and the first and most important point in this regard is the selection of the coal from which we intend to manufacture our domestic coke. Certain coals produce cokes which it cannot be pretended are suitable for this purpose; and therefore only by a process of elimination can the perfect blend be achieved. Needless to say, this blend should be suitable for gas making and for giving a coke of the correct structure, low in ash content, clean, smokeless, and fitted in every respect for the duty it has to undertake. It need hardly be added that it is most desirable that the moisture content should be as low as possible; but this is a matter which concerns the treatment of the coke after leaving the retorts, and which, neglected, can readily undo all the preceding good work. It is also highly necessary that "tacky" coke, containing volatile matter to any appreciable extent, should be precluded from the domestic market. Should this precaution not be taken, the smokeless attribute of coke—our greatest asset—would be open to question.

The mere production of a coke fulfilling all the above *desiderata* will not, to my mind, suffice. Further treatment is necessary to render it as attractive a proposition to the householder as is possible; and, with that object in view, I submit that the grading of coke is a vital necessity. It is here that we can secure an obvious advantage over raw coal, by the supply of a fuel of uniform size. This is an advantage which the householder is quick to appreciate, as is apparent from the rapid increase in domestic sales following the installation of a grading plant. This is not the experience of one, but of many gas undertakings. In addition to supplying a size of coke suited for the duty it has to undertake, grading eliminates from the bulk the dust, fines, and breeze, containing a fairly heavy ash and moisture content. Thus graded coke is as scientifically perfect as modern practice can make it.

We now come to the second essential—advertisement. Advertisement implies education, which in this case embraces the riveting of public attention upon the advantages and undoubted good qualities of coke. Coke needs and merits national advertising that will educate and convince. We have our national publicity agents for the sale of gas, tar, and sulphate of ammonia; but the national ambassadors of coke are conspicuous by their absence. I venture to say that our coke market is second only in importance to our gas sales, and that it can only be developed along correct lines by co-operation and collective enthusiasm.

Local advertising we have in plenty. Some is well conceived, and based on sound principles; but how often do we see the slogan "Buy Gas Coke" followed by the price per ton? Such publicity will never sell our product. Goods sell when the public is educated and convinced. In other words, sales are founded on facts. If we can honestly tell the public that our coke is suitable for domestic consumption, clean, low in ash and moisture content, graded, and, above all, smokeless, there is no reason why the greater portion of the domestic market should not be ours.

Every successful marketed article has its "selling points;" and the astute salesman lights upon one of these points, which individually is greater in its striking force than any of the others, and hammers home his argument, using this point as his chief weapon of aggression. The attribute he selects is generally known as his "selling point" and forms the chief plank in his propaganda platform. The smokeless quality of coke is our "selling point;" and, with proper treatment and wise utilization, this point is bound to influence the public in the same manner as the smokeless, clean, efficient, and convenient properties of the gas fire, which have placed it in the position it holds to-day. The admirable work of the London Coke Committee is sufficiently well known without my eulogy; and I suggest that, in the best interests of the gas industry, this system should be extended on a national basis.

There is another point that occurs to one in connection with coke sales. All gas undertakings keep a careful record of their gas consumers and their consumption of gas. Should this consumption fall-off or cease, inquiries are very soon set on foot to elucidate the reason and, if possible, to regain the lost business. How many gas undertakings can say this of their coke business, which is almost as vitally important? A record of coke customers and their consumption should be kept by every gas undertaking, and any decrease followed-up and investigated. A complaint given personal attention and rectified in time not only saves a customer, but probably in the end adds many more. It is found that personal canvassing, where coke consumption has fallen-off, produces excellent results. I am of the opinion that there is nothing so effective in business as the personal touch.

It should likewise not be forgotten that, in almost every instance, a coke customer is a gas consumer; and any bad management in the coke department may reflect itself in the future attitude of that customer to gas. It is a noteworthy fact, in the case of most gas undertakings, that if each gas consumer could be persuaded to purchase not less than one ton of coke per annum, the problem of coke disposal—sometimes difficult—would be solved.

To summarize these remarks, I consider that the following points are worthy of attention, in order that we may develop our domestic coke market:

(1) The selection of the proper coal or blending of coals, suitable for gas making, which produces a coke fitted for domestic use. This subject would appear worthy of investigation.

(2) The supply of suitable coke, clean, low in ash and moisture content, smokeless, and graded.

(3) The development of an efficient transport department for the delivery of coke to customers' premises. In this regard, the employment of uniformed men should be considered, together with the delivery of coke in bags, thus obviating the dirt and dust otherwise inseparable from coal deliveries.

(4) The education of the public as to the advantages of coke for domestic usage, particularly with reference to its smokeless properties. In this regard, attention could be drawn to the dangers of smoke and its deleterious effects on the public health. Such education to be in the hands of a National Association moulded on the lines of the London Coke Committee, and to be by means of national advertising, lectures, demonstrations, &c.

(5) Local publicity of a suitable character.

(6) The placing of our domestic coke trade on the same basis as our gas business, with a record of customers and their consumption.

(7) Inducement to gas consumers to burn coke wherever possible.

(8) The incorporation of the ideals of service in this scheme, with the realization that a satisfied customer achieves more than pounds spent on publicity.

In conclusion, I have the utmost confidence in the future of the domestic coke market, which has immense possibilities, and cannot but expand if founded on correct principles and developed with unbounded optimism and unflagging zeal.

I wish to express my sincere thanks to my respected Chief, Mr. William H. Ely, M.S.E., for his kindly help, which has rendered possible the presentation of this contribution to your meeting to-day.

GREAT BRITAIN'S FIRST WATERLESS HOLDER.

Inauguration Ceremony at Ipswich.

A new chapter in the gas industry of this country was opened at Ipswich last Thursday with the turning-on of gas to the town from the first waterless holder to be completed in Great Britain. The ceremony was of an informal but extremely pleasant character, and was carried through in the presence of a small gathering of gentlemen, assembled as the friends and guests of Mr. Henry Woodall, M.Inst.C.E., J.P., the Chairman of the Ipswich Gas Light Company, who was supported by colleagues on the Board.

AT THE INAUGURATION OF THE IPSWICH HOLDER.

On arrival at the offices of the Ipswich Gas Light Company in Carr Street, the visitors were welcomed by Mr. Henry Woodall (the Chairman) and Mr. Frank Prentice (Engineer and Manager), and were then taken to the new governor house at the gas-works, where Mr. Woodall turned-on the gas from the waterless holder to the town.

THE HOLDER.

As President of the Eastern Counties Gas Managers' Association, Mr. Prentice last May delivered his address, and much of what he had to say naturally concerned this new holder. The meeting, too, was held in Ipswich, so that the members had an opportunity of inspecting the holder, which was at that time in an interesting stage of construction—a good many rows of plates having been fixed in position. The plan of erection of these holders is peculiar. After the bottom has been placed on the foundation, the roof is the next work undertaken, thus providing a certain degree of protection for the workmen. The next step is the piston, to which the roof is temporarily connected, forming an erection platform, which is blown up tier by tier as the work proceeds, and provides a continuous check on the accuracy of erection. On this the revolving erecting crane is fixed.

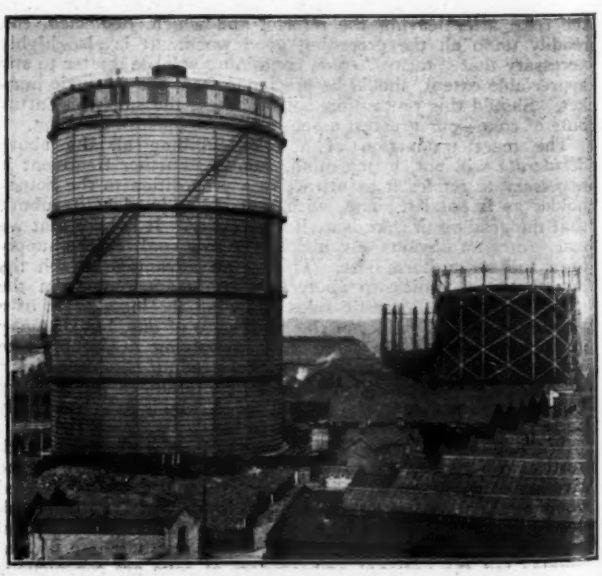
The Ipswich holder is of 2 million c.ft. capacity, and is somewhere in the region of 200 ft. in height. The colour finally decided upon is a pleasing French grey, with the galleries and railings in white. The first gallery is 40 ft. from the ground; and the same distance separates each from the next. Though not shown in the photograph, there is a huge indicator, consisting of white figures and pointer on a black background, which will enable the contents of the holder in hundreds of thousands of cubic feet of gas to be read a considerable distance away.

The considerations favouring the erection at Ipswich of a holder of this new type have already been explained; and, broadly speaking, they resolve themselves into cheaper cost and constant pressure. But these considerations were not permitted to prevail until after searching inquiry had been conducted by Mr. Woodall and Mr. Prentice, the result of which was to give them absolute confidence in this new type of holder.

When informing the manufacturers that he was prepared to have one of these holders, Mr. Woodall stipulated that they should employ a British firm to do the work; and subsequently the Directors accepted the tender of Messrs. Edward Cockey & Sons, of Frome, and not that of a German firm. Most of the material came from Germany; but what could be procured here was so obtained. Some of the accessories were made in Ipswich. The Company themselves undertook the foundation work, which was completed practically at the end of last year. The speed with which these holders are erected is one of the advantages claimed for them. The following is a record of the progress of the work at Ipswich, up to the commencement of the erection of the shell:

Foundations commenced	Oct. 13, 1926
,, finished	Dec. 16, 1926
Bottom completed	Jan. 13, 1927
Roof ,,	March 18, 1927
Piston ,,	April 8, 1927

With these holders the pressure given can be varied according to requirements by weighting the disc; and a constant pressure up to 15 to 20 in. of water can be relied upon if such a pressure is required. The Ipswich holder is arranged to give 10 in. When alluding to the matter in his Presidential Address, Mr. Prentice pointed out that the weight of a 2 million



A View of the Tankless Holder.

spiral-guided holder with tank and water is around 18,000 tons. The weight of a waterless holder of the same capacity is about 800 tons. The maximum pressure on the foundation ring is not more than 1 ton per sq. ft.; the pressure on the remainder being less than 100 lbs. per sq. ft.

LUNCHEON AT THE OFFICES.

Returning—after some of the more enterprising members of the party had, in a high wind, climbed on to the roof of the holder—to the Gas Offices, the visitors sat down to luncheon, with Mr. HENRY WOODALL in the chair. He was supported by Mr. Hugh Turner (Vice-Chairman of the Company) and Messrs. F. Corder, G. H. Hewetson, and Henry Miller (Directors). The Mayor of Ipswich (Mr. C. E. Tempest) was present, together with Mr. A. Moffat (Town Clerk). Mr. Thomas Hardie (Chief Engineer of the Gas Light and Coke Company), who, it is known, is at present closely concerned with waterless holders, and Mr. J. F. Ronca (Director of Gas Administration to the Board of Trade) were among the guests, with Mr. W. F. Perkins (Chairman of Messrs. Edward Cockey & Sons), Herr Kappler (representing the inventor of the waterless gasholder), and M. J. Le Boutillier and Mr. J. L. Chaloner (who are also associated with it). Mr. H. C. Smith (Chief Engineer to the Tottenham District Light, Heat, and Power Company) was present, and so were Mr. J. W. Auchterlonie (Engineer to the Cambridge University and Town Gas Light Company), and Mr. W. W. Townsend (Engineer to the Colchester Gas Company), with his Chairman (Mr. W. Gurney Benham). Mr. Frank Prentice was there, with Mr. G. Ambrose Mallett (the Secretary), and other officers. The Chairman said that Sir David Milne-Watson greatly regretted his inability to be present.

PROUD OF THE GAS COMPANY.

The MAYOR said he was very glad to be present to join in this pleasant little ceremony. He was proud of being Mayor, he was proud of this ancient borough, and he was proud of what the Ipswich Gas Company had done. It said a great deal for the enterprise, courage, and—should he say?—daring of the Directors of the Company that they should have been the first in Great Britain to put into operation a holder such as they had seen that day. ["Hear, hear."] The clear vision and the great knowledge of the Chairman had carried the Company through to a great achievement, in the way of doing something that had not been done in England heretofore. Of course, it would be out of place for him (the Mayor) to prophesy what was likely to happen in the future; but he was quite sure that the action of the Ipswich Gas Company would be quoted over the length and breadth of the land. He proposed "Success to the Ipswich Gas Light Company."

IPSWICH FIRST.

The CHAIRMAN, responding, said it was very pleasant for himself and his colleagues to have a few friends and neighbours with them to celebrate the putting into operation of their waterless holder. They were, not unnaturally, somewhat gratified in having at Ipswich the first holder of this type erected in the British Isles; and he was confident that soon the numerous advantages of the waterless holder would be more fully recognized, and that many would follow. This was hardly the occasion to go into technical details; but there were one or two points he would mention. With a tankless holder, there was no doubt it was there. They would remember the story of two special constables instructed during the war to guard a spiral-guided holder. When they took over, the holder was full; but during the night the gas was all exhausted. At dawn the two men looked for the holder, and found it had disappeared; and they spontaneously ejaculated, "Great Scot, they've pinched it." Well, that could not happen with the waterless holder, though the frivolous might wish it could. [Laughter.] He hoped they would agree that in appearance the new holder was at least as attractive as other forms to which they were more accustomed.

ADVANTAGES OF THE NEW TYPE.

The great advantage to the Ipswich Gas Company of the waterless holder was that it gave a constant pressure, and would save the cost of boosting. The Company had the experience of others—and they had no reason to expect their own would be different—that the savings due to this type of holder were much greater than the extra costs, altogether apart from any saving due to the constant pressure maintained. He was inclined to think that these holders would be found of very great advantage in long-distance distribution of gas, which, he believed, would become more and more important. It would be appreciated that the Directors were not anxious to purchase a gasholder from Germany; but they could not get what they wanted here. When Mr. Prentice and he visited Germany to inquire into the working of these holders, they saw the makers; and he (Mr. Woodall) asked them for a price for the holder. They gave him one. He then said he would not purchase from them direct, but would pay a somewhat higher price to an English contractor. The result was that "M.A.N." made such arrangements that Messrs. Edward Cockey & Sons were able to give them a price, and guaranteed to use as much British material and labour as was possible. The outcome of the action of the Board had been that British gasholder builders—who were the most experienced and best gasholder builders in the world—had now completed arrangements to make these holders in this country of British material; and he did not think the shareholders in the Ipswich Company would object to the Directors paying a little more for the work if it had resulted in bringing to this country what might be a very important addition to the constructional steel industry. It would be quite understood that the cost of the holder, including the extra they had paid, was still very much less than that of any other type.

ACKNOWLEDGMENTS.

He was pleased to bear testimony to the admirable work of the "M.A.N.," and to thank them for the very fine job they had given the Company. Many of those present were well qualified to judge work of this character; and he felt sure they would all be agreed that it was a first-class job in every respect. Ipswich had always been a progressive town; and he knew that the citizens would welcome the fact that the Company who had the privilege of supplying them with gas were keeping abreast of the times. On behalf of himself and his colleagues he thanked the Mayor for his presence there that day. He also thanked Messrs. Cockey & Sons for the excellent job they had given the Company, and he trusted that the new holder would do all that was hoped and expected of it. [Applause.]

AN INTERESTING AND HISTORIC OCCASION.

Mr. W. F. PERKINS said he desired, on behalf of Messrs. Edward Cockey & Sons, to ask the Chairman's acceptance of a small souvenir of this interesting and historic occasion. The souvenir was a silver inkstand in the form of a model of the new holder, to scale, and bore the following inscription:

> Presented to Henry Woodall, Esq., M.Inst.C.E., Chairman of the Ipswich Gas Light Company, on the occasion of the inauguration of the first waterless gasholder erected in Great Britain, Sept. 29, 1927.

Messrs. Cockey & Sons were proud to be the firm to put up the first of these waterless holders in this country. He believed that the other holders on this principle which were being erected were going, if possible, to be better even than this one. He particularly desired to thank the Company for the kindly manner in which they had received the numerous deputations of experts who had come to Ipswich to see the holder. Help had been afforded in this way which had proved of great assistance to the manufacturers.

The CHAIRMAN said he appreciated very much the handsome gift.

UNBOUNDED PRAISE.

Mr. FRANK PRENTICE remarked that the holder which they had seen that day was something which had occupied his mind, both day and night, for the last twelve months. When he first heard of the waterless holder, he had in contemplation an increase of the storage capacity at the Ipswich Gas-Works; and, in addition to this, he had in view the almost imperative necessity of putting down a boosting plant in order to supply gas in sufficient quantities and at sufficient pressure during the cooking hours—the embarrassing hours of the twenty-four. It occurred to him that if he could get a constant pressure with a waterless holder—or tankless holder, as it was then called—there might be something in it for his purpose; but at first sight it did seem to him an impossible thing to make a satisfactory seal. However, after hearing the excellent paper read by M. L. Rolland D'Estape before the Institution of Gas Engineers, and after studying the replies to questions asked, he felt assured that the author of the paper knew what he was talking about, and that he had a very good thing. Later his Chairman and he went abroad and made a thorough examination of the methods of production of the holders, and had conversations with men who were using them and understood all about them. They heard unbounded praise of these holders, and of confidence in its use expressed by a second, and in one instance a third, order. They felt, therefore, that they were on safe ground.

"THE HOLDER OF THE FUTURE."

It was matter for pride that Ipswich should be the first place to see one of these holders completed in Great Britain; but he would be greatly surprised if this type did not become "the holder of the future." To don the prophet's mantle was unwise; but it was already known that other people had examined these holders, had confidence in them, and were putting them up at the present time. There had been a number of visits of distinguished engineers to Ipswich; and without exception they had expressed in the very highest terms their appreciation of the work, the way in which it had been carried out, and the almost certain results which might be expected. Everything went to convince him that they had "backed the right horse" this time, and that their holder would be a great success.

GAS LIGHT AND COKE COMPANY'S FOUR EXAMPLES.

Mr. THOMAS HARDIE thanked the Chairman for the opportunity of being present on so exceptional an occasion. Great Britain was as a rule more ready to send its ideas abroad than to take the ideas of other lands; but now this country had accepted a design of gasholder which was quite novel to it, and which, after examination, had commended itself as a likely method of construction, at any rate for large sizes. In saying this, he wished to recognize the work that had been done by Herr Jagschitz and the staff at the "M.A.N." There was not only the designing of the holder, but also the successful carrying out of the work. The Chairman was to be congratulated upon having seen the great advantages of this form of construction; and from his ability as an engineer, and from his vast experience, they could feel very well assured that what Mr. Woodall recognized as being the right thing was the right thing. Besides being Chairman of the Ipswich Company, Mr. Woodall was Deputy-Governor of the Company which he (Mr. Hardie) had the honour to serve; and Mr. Woodall had satisfied the Gas Light and Coke Company to such an extent that they now had four of these holders on order. Thus Mr. Prentice could feel assured that he was backed-up by the ideas of the Gas Light and Coke Company on this subject.

FOR THE "M.A.N."

Mr. J. LE BOUTILLIER said that, on behalf of the "M.A.N.," he would like to thank Mr. Woodall and Mr. Prentice for the opportunity they had given that firm of introducing the waterless gas-

holder into Great Britain. He (the speaker) was not a gas man, but merely an iron and steel man; and when the "M.A.N." put on the shoulders of his firm the introduction and sale of their gasholders in Great Britain, they found themselves in a very difficult position. He was glad of the opportunity now of thanking the Chairman and Engineer at Ipswich in the first place for the kind way in which they listened to the firm when they came and put their proposition in front of them, in the second place for the thorough manner in which they investigated the details of the invention for themselves, and in the third place for having given the order. He appreciated all this very much indeed—especially in the difficult circumstances.

MEETING OF THE BRITISH ASSOCIATION.

FURTHER MATTERS DISCUSSED AT THE LEEDS MEETING.

[See also issues of the "JOURNAL" for Sept. 7, 14, and 21.]

INVENTION AS A LINK IN SCIENTIFIC AND ECONOMIC PROGRESS.

[From the Presidential Address to Section G.]

By Prof. Sir James Henderson.

Dealing solely with the big inventions and their development, I wish to examine the question of how to eliminate, or at least minimize, the difficulties that obstruct the inventor, and so retard the march of progress.

The first way that suggests itself to me is by means of education. Our educational policy in schools on the scientific side deals with physical laws as facts; and the teacher generally deals only with phenomena with which he can afford to be dogmatic, and ignores the enormously greater range of phenomena about which science knows little or nothing. This system inevitably breeds in the student, and in the general public, the impression that Nature acts according to certain definite laws, and that there is nothing about these laws which is not known to science. In actual fact, the more the scientist knows about these laws, the more he is impressed with his ignorance and the failure of science to fathom the complexity of Nature. Much of the misunderstanding of invention and its difficulties is due to this method of teaching, and will endure so long as that method is maintained. If it were possible to teach physical and chemical science historically, much could be done to counteract this injurious effect.

A second possible remedy to encourage invention and minimize its difficulties is by means of legislation. I hesitate to enlarge on this point, because the question of patents is a controversial one among scientists, and between inventors and the outside public; but it seems to me anomalous that a man who makes an epoch-making invention which is going to revolutionize an industry and add millions to the wealth of the nation receives exactly the same degree of protection for his invention as the man who invents a new kind of shirt button.

In America, it is possible for an applicant for a patent, by filing periodical amendments of his specification, to keep the application pending in the Patent Office for a number of years, during which he can be developing the invention and adding to the specification any further explanations which may be called for in the light of the experience gained. Then, when the patent is eventually issued, it runs for seventeen years from the date of issue, whereas a British patent dates from the time of application. In addition to this, an American patentee, on any question of priority of invention, is allowed to produce any evidence that may be available to show conception of the invention up to not more than two years anterior to the date of his original application.

In this way, an American inventor can spend several useful years perfecting his invention before his patent is granted; while the British inventor has often to watch the most useful years of his patent being eaten-up in unproductive development. I admit that the American system has drawbacks from the point of view of an industry. It has, however, certain advantages; and I suggest that our system does not meet the needs of great inventions, between which and the ordinary minor inventions there ought, in my opinion, to be some discrimination. Merely as a suggestion, I see a possible solution in an extension of our present system of granting patents of addition—that is, a patent for an improvement on a prior patented invention—the patent of addition being granted during the lifetime of the original patent, and running coterminously.

I have one more suggestion to offer—a suggestion which touches this Association and kindred bodies more intimately. On this question of assisting future inventors by increasing the store of knowledge at their disposal, I see a possible sphere of usefulness for this Association and kindred institutions by encouraging the great inventors of to-day to place on record and publish through the medium of the Association or institution an account, even a brief one, of the main historical features of their inventions. If my suggestion be adopted by this Association, would it not be in the best interests of science to remember the failures as well as the successes, and to encourage all serious workers in important fields of research to furnish in the common cause a record of their work, even when their aim has not been achieved, giving a faithful account of all the difficulties and all the efforts made to surmount them? Who knows but that many of the so-called failures of yesterday may only be waiting for other hands to-day to carry them on to a greater success than the world has yet known? Left to themselves, they will lie in oblivion; yet, for all we know, two of them may fit together and provide the answer to one more of the riddles of the universe.

Knowledge forms the working tools of science; and my proposal is in no way aimed at giving the scientific workers of to-morrow an easy task. They will probably have a far more difficult task than ours; but I do not think it fair to condemn them to spend part of their time in a preliminary, and possibly fruitless, search for tools which we have forged and hidden. "As one lamp lights another, nor grows less," science of to-day will partly fail in its clear duty if it fails to pass on to to-morrow any of the knowledge which it has been privileged to acquire, or if it forgets that it is for to-morrow, rather than to-day, to assess the true value of to-day's success and failure.

ACCIDENT CAUSATION.

By Eric Farmer.

This paper, on "Certain Psychological Aspects of Accident Causation," gave an account of some researches by the Industrial Fatigue Research Board, with the object of ascertaining if individual differences in accident liability manifested were in any way connected with other measurable personal differences. Various industrial groups were selected, mostly from the engineering trades, in which each individual's exposure to risk was as far as possible the same, and it was then arranged to give them various tests, and compare their performance in the tests with the number of accidents sustained over a given period.

One interesting result of the Board's psychological inquiry into the personal factor of accident causation is, it is claimed, that it gives an unmistakable indication that the difference in accident liability between individuals can no longer be attributed to a difference in exposure to risks, since those who have a high accident rate have been found to differ in other measurable qualities from those who have a low accident rate. As the tests were given in most cases before the accidents had been sustained by the individuals concerned, it had to be assumed, in order to hold the view that difference in accident liability is solely a matter of difference in exposure, that those who failed at the tests tended on the whole to be exposed to greater risk than others. Such an assumption was so unlikely that it was purely fanatic—especially when it was realized that no one who had any connection with the allocation of the subjects' industrial tasks had any knowledge of their performance in the tests, and that failure in the tests was found to be connected with an undue accident liability in all the groups tested. The inquiry had shown that the difference in accident liability is connected with other measurable personal differences, and is therefore a real personal difference, and cannot be accounted for merely by a difference in exposure to risk.

A positive correlation was found to exist between the frequencies of trivial and serious accidents, and also between the number of accidents and the number of sicknesses. There was also evidence to show that the industrially inefficient sustain more accidents than others. This latter point needed further substantiation before it could be accepted with any confidence; but should it ultimately turn out to be true, it would be of considerable practical importance to industry. It would mean that certain persons find the strain of modern industrial life too severe, and react unfavourably to their environment by sustaining accidents, going sick, and being less efficient than their fellows. This would bring the study of the personal factor in accident causation into close conjunction with vocational psychology, and would form part of the general study of the individual's adaptability to industrial conditions.

The study of the personal factor in accident causation, continued the author, is at present in a very immature state; but it is sufficiently advanced to show that it is practicable, and can be approached by the ordinary methods of experimental psychology. Since these tests other psychological qualities have been examined; and although at present no definite account can be given of this work, it certainly tends to show that accident liability is determined by many different factors. Whether it will be ultimately possible to devise a group of tests which will

take all these various factors into account—allowing for each its proper weight—has still to be discovered.

EDUCATION AND INDUSTRY.

Section L discussed the association between education and industry; the DUCHESS OF ATHOLL, M.P. (President of the Section), in the chair.

Mr. T. WICKHAM MURRAY (Secretary of the Association of Teachers in Technical Institutes), in a paper on "New Outlooks and Tendencies," said that to-day the technical colleges provided the best link between education and industry. Almost everybody was convinced of the need for a closer liaison between the two for the benefit of the large proportion of the population who sought a living in industry, and for the improvement of industry itself; but unfortunately there was as yet no adequate national policy under which the two could be brought together for their mutual benefit. Such a policy could not be formulated without a revision of some of those ideas which at present made-up our educational philosophy. Industry believed that technical education was absolutely essential, and that the time was now ripe for an advance. With proper co-operation between educationists and industrialists, immediate advance should be effected along the lines of the grouping of educational facilities, the contents of the curricula, the supply of efficient staff, and research.

Mr. E. WALLS (of Messrs. Lever Bros.) remarked that, with regard to elementary education, his feeling was that they should teach less rather than more. He favoured the retention of the school-leaving age, but hoped the day would come when some compulsory general education—physical and mental—would be universal up to the age of 16 or 18, merging gradually into vocational training. The great thing to aim at was continuity of education. He regarded this as far more important, from the standpoint of industry, than the raising of the school-leaving age could possibly be.

Mr. J. H. EVERETT (Leeds Technical College), speaking of the need for the whole-hearted support of industry, said they should have more advisory committees than at present existed. He had seven advisory committees, each dealing with particular industries—such as engineering, &c.—and consisting partly of employers and partly of operatives from the trades unions and any other bodies interested in technical education in the particular industries. These met regularly and discussed matters connected with the training of pupils; but he was convinced there was not sufficient of that done. There were needed not only local, but national advisory committees; and educationists were ready to meet the employers in order to be able to supply what the latter needed.

Mr. A. P. M. FLEMING, indicating how industrial firms themselves have attempted to provide suitable educational facilities for their workers, said that the gas industry, whether municipally organized or controlled by companies, is outstanding in its belief in the education of its workers. The Gas Light and Coke Company make attendance at either their own or London County Council classes a condition of employment; while the juvenile employees of the Gas Department of the Birmingham Corporation attend a day continuation school for one day per week in their first year, and evening classes conducted by the local education authority's teachers or the Gas Department staff subsequently.

INSTITUTION OF PUBLIC LIGHTING ENGINEERS.

Proceedings at the Brighton Conference—concluded.

STREET LIGHTING AND TRAFFIC PROBLEMS AS SEEN BY A CHIEF CONSTABLE.

By R. L. MATTHEWS, O.B.E., Chief Constable of Leeds.

[Extract.]

There is no disputing the fact that the continual improvement in lighting conditions has been an important factor in the decrease of crime; but to-day we are faced with an additional, and, perhaps, equally serious, menace at night time by reason of the large increase in mechanically-propelled vehicles and the high speed at which these are permitted to be driven as compared with the speed of horse-drawn vehicles.

From a street-lighting standpoint, the lay-out of different cities and towns varies considerably. The industrial portion (as is the case in Leeds) is usually very congested, whereas the population two or three miles from the centre of the city or town in most cases is sparse. Leeds, for instance, with a population of about 460,000, is called upon to light 587 miles of streets; the area covered being greater in proportion than in some other cities with larger populations. This is, no doubt, chiefly attributable to the larger number of main arterial highways radiating from the centre of the city and the many intersecting roads connecting them, some of which at the present time are sparsely populated. At the moment there are in Leeds some 18,000 street lamps.

All who take an interest in this subject must admit that in recent years great advance has been made in street lighting, and this has been inevitable in order to keep abreast of the times, having regard to the increased volume of traffic along our main thoroughfares, and the necessity of securing immunity from accidents as far as possible not only for pedestrians, but for the drivers of all vehicles whether mechanically propelled or otherwise.

Electricity when used for street lighting is the more easily available in the event of sudden darkness. Gas would certainly be preferable to electricity as being less likely to be liable to a general breakdown of the system of illumination.

I have been deeply interested in various suggestions which have been made from time to time on the subject; and I think I cannot do better than subjoin a summary of those with which I entirely concur.

1. All road surfaces, footways, junctions, and crossings should have an even illumination.
2. There should be no dazzle or glare from "naked" light.
3. Shadows should be eliminated as far as possible, for nothing is more disconcerting to a driver than suddenly to discover a dark stationary object on the road just in front of him. It would seem that the only real protection the motorist can resort to against this difficulty—*i.e.*, when shadows are prevalent—is the use of powerful headlights.
4. Uniformity should also be aimed at so far as height and power are concerned, and also in regard to the distance between lights, according to the volume of traffic likely to be on the road. This could no doubt be accomplished by the various lighting authorities conferring and agreeing on these points.
5. All danger, direction, destination, and village signs should be adequately illuminated.
6. All lighting should be governed on a principle which would give facilities for additional illumination as a set-off against any curtailment of light provided by theatres, music halls, cinemas, hotels, shops, &c.
7. Additional lights should also be provided on lamp standards at important crossings and junctions, with a view to assisting drivers to avoid accidental impact.
8. In several cities and towns, tramway traffic is diverted from the line of main road traffic to special tracks constructed on the side of the road. This is an especial danger; and an indication at each end which can be clearly observed both by day or night should be erected to warn drivers of vehicles, other than tramcars, that the tramway track is diverted.

The best type of street lamp for important thoroughfares is, in my opinion, an overhead light centrally fixed. This light, by reason of being above the street and the obstructions thereon, whether vehicular or pedestrian, illuminates a very large surface and throws no shadow in the centre of the road, which is an important matter from the point of view of the driver of a fast-moving vehicle. It is also much safer under such conditions for a traffic constable on point duty after sunset. I may here observe incidentally that our Street Lighting Engineer is assisting me considerably in this direction.

My next point is that as far as possible lamps should be installed upon a universal system, easily discernible by the travelling public, with a view to eliminating the danger which undoubtedly exists at certain places where street lamps are erected along the chief suburban roads.

OBSTRUCTIONS ON HIGHWAYS.

At the present time obstructions on highways are principally illuminated by red lights, irrespective of whether the obstruction is on the off or the near side of the approaching traffic; and I only desire to draw attention to this matter because, in my opinion, it is a real source of danger to motorists and other users of the road.

A red light is generally an indication that there is an obstruction which should be passed on the off side; but if the obstruction on the highway is already on the offside of the road, and a driver endeavours to pass the red lamp on the off side in accordance with general practice, in all probability an accident of a more or less serious nature will occur. I would, therefore, suggest for your consideration that when an obstruction is on the road, on-coming traffic should be warned of such by a red light placed on the extreme point of the obstruction nearest the centre of the road, and that a white or, better still, a green light be displayed at the other end nearest the centre of the road, to warn traffic proceeding in the opposite direction. This provision would have the same effect upon drivers of

vehicles as is the case at the present time when overtaking or passing other travelling or stationary vehicles on the highway.

With regard to the illumination provided by shops, &c., there would appear to be no doubt that the modern tendency is to keep the windows of shops well lighted until late in the evening. Clearly the occupier's primary reason for this is with a view to advertising his goods; but, on the other hand, it also safeguards his property and affords better facilities to the police for supervision purposes. At the same time it also promotes additional street lighting, and usually during the period when night traffic is at its height. Street illumination should, in my opinion, be continued to a limited extent to the hour of daybreak.

I have already referred to the immense improvement in public lighting during recent years; and I think we are all agreed that there is still room for co-operation with a view to securing yet further improvement. I have every confidence that in the capable hands of the lighting engineers everything will be done through the medium of this and similar conferences to obtain the best results, and in due course there will be attained a satisfactory solution to this difficult and ever-increasing problem.

In conclusion, may I suggest that your whole-hearted association and co-operation with Chiefs of Police on the question of street lighting be continued and developed, as the subject is one of great importance to the police in relation to the control of traffic, the prevention and detection of crime, and the safeguarding of property.

Discussion.

Councillor T. Adam (Chairman of the Edinburgh Lighting Committee) said they were faced with considerable difficulties in Edinburgh because of the roads they were making and the increased speed of motor traffic. At many points they had large areas left at the crossings; and it was hard to decide what form of lighting to adopt. They intended to use a beacon light in the centre of these circles; but even then it might be difficult to show sufficient light over the whole space. A uniform system was desirable; and some central body—like their Institution—should formulate proposals, and after proper consideration submit them to the Ministry of Transport. This was the only way by which progress could be made.

Alderman Joseph Taylor (Chairman of the Lighting Committee, Bolton) remarked that until quite recently their lamps in Bolton were 50 years old. They were a common type of lamp in which there had been no improvement over this period. They were, however, now adopting a new form of lamp which obviated all shadows.

Councillor C. W. Carry (Convener of the Lighting and Watching Committee, Aberdeen) expressed the hope that the question of traffic control would not be allowed to drop.

Mr. Leon Gaster (speaking on behalf of the "Safety First" Council) said the House of Commons had passed a Road Transport Bill with not a word about street lighting in it. It was absolutely essential that the Institution should impress upon the authorities that it was their duty to consider this important question. If the Ministry of Transport took over the road surface, they should also look after the lighting of it.

Councillor Anthony Oates (Vice-Chairman of the Lighting Committee, Newcastle-on-Tyne) urged that "Safety First" should be one of the rules of all lighting authorities—particularly in big towns. In his own city, they took care that junctions and cross roads were brilliantly lighted.

Co-Operation and Co-Ordination Essential.

The President said that authorities chose their own lights and signs, and motorists up and down the country would find a different state of things in different places. There should be co-ordination and a standardized system throughout the country. ["Hear, hear."] On the face of it, there was only one way in which this could be accomplished—by the bodies who were interested in the matter getting together, with the Minister of Transport, in the form of a general committee, and drawing-up proposals embodying what they considered to be the best method of dealing with this problem.

Mr. Matthews agreed that whatever signs were used should certainly be universal.

Councillor J. McDougall (Vice-Convener of the Glasgow Lighting Committee), proposing a vote of thanks to the author, said there must be co-operation between the officials of every town and county. There must also be co-operation between finance committees and lighting committees on this matter. It would not do to economize. There was a claim by the local authorities on the Road Fund, for the better lighting of roads used by mechanical vehicles of all kinds. Further, there must be co-ordination throughout the country in the matter of lights, signs, &c. These were the lessons to be drawn from the paper.

Institution of Chemical Engineers.—The Institution is opening its session for 1927-28 with an important lecture, to be delivered by Sir William Bragg, K.B.E., F.R.S. The subject will be "Crystallization," and the meeting will be held at the Institution of Civil Engineers, Westminster, on Friday, Oct. 28—the President, Sir Alexander Gibb, taking the chair at 6.30 p.m. There will be no charge for admission; and tickets (to admit two) can be obtained on application to the Hon. Secretary, Institution of Chemical Engineers, Abbey House, Westminster.

"HAILGLASS."

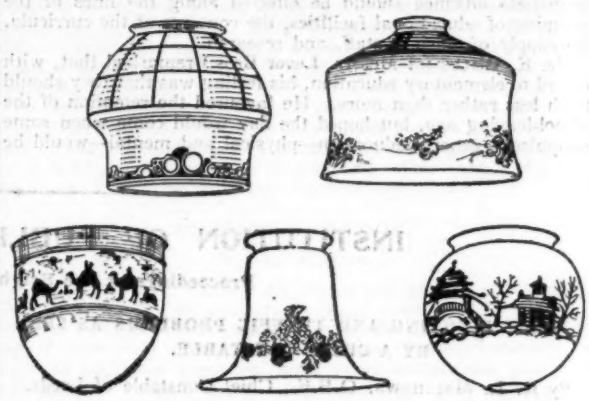
Artistic Lighting in Home and Industry.

The firm of Hailwood & Ackroyd, Ltd. (formerly Ackroyd & Best, Ltd.), of Morley, is well known to the gas industry, which is not slow to recognize and appraise first-class workmanship. The word "Hailglass," which serves as a title for this short article, is a general term used by the firm for all the various kinds of glass they make. This glass is produced only at Morley, and each process in its manufacture is scientifically controlled.

Good Lighting Aids Health.

There can be no question that the need of the world to-day is cheerfulness. Nothing drives away sadness and brings good cheer to home, office, shop, or factory so much as tasteful, artistic lighting. Besides being definitely injurious to the eye, unshaded lights are harsh and cruel in their effect. The human eye is very sensitive; and if it is irritated, the whole system is adversely affected.

Illustrated here are a few examples of the products of Messrs. Hailwood & Ackroyd. The firm not only make beautiful glass-



A Few Examples of the "Hailglass" Globes and Shades made by Messrs. Hailwood & Ackroyd, Ltd.

ware of choice and costly designs, but have departments specially laid out for producing various types of glassware by mass production, to compete with the products of other countries. This glassware they offer at most reasonable prices. As a matter of fact, the firm have a large art staff engaged in creating beautiful decorative designs, and also new shapes in glassware; and those responsible for the retention of the gas lighting load would be well advised to keep in touch with the new products. Regarding this, Messrs. Hailwood & Ackroyd do their part by publishing at frequent intervals profusely—and, it may be said, delightfully—illustrated lists.

Designs and Colours to Satisfy all Needs.

Some of the firm's bowls, globes, and shades are tastefully decorated with ceramic colours burnt in, and which are washable. They have designs, colours, and shapes to harmonize with the most delicate and elusive decoration scheme for home, hotel, theatre, office, or church; and these decorations are carried out on all the various kinds of glass they make—*e.g.*, opal, three-ply, double-ply, frosted, satin finish, clear, "Hailuxo," and coloured. With regard to advertising glassware, the firm have a special department devoted exclusively to this side of the business, and they produce designs of any nature to customers' requirements.

Mention has been made of some of the types of glass which are manufactured by Messrs. Hailwood & Ackroyd; and further notes on these will doubtless be of interest. Opal glass is supplied either dead white or cream. "Opaline" is white, and, though of sufficient density to prevent glare, transmits the maximum of light. "Opalescent" is milky, but transmits nearly as much light as clear glass. "Three-Ply" is a cased glass with a thin layer of opal glass between layers of clear glass. It diffuses the rays and gives an intense white light without glare. The firm also supply this glass with inside and outside surfaces satin polished; or the inner layer may be yellow, rose, or any other tint. "Hailuxo" is a heat-resisting glass.

Messrs. Hailwood & Ackroyd have two showrooms in London; one at 32, ShaftesburyAvenue, W. 1, and the other at 98, Mansell Street, E.

Scottish Junior Gas Association.—The opening meeting of the session will be held in Edinburgh, at the Alexandra Café, on Saturday, Oct. 15, when Dr. Harold Hartley, of the Research Laboratories of Radiation Limited, will deliver an address. Following the business proceedings, there will be a social evening, to which ladies are invited.

THE GAS UNDERTAKING OF THE BUCKHAVEN AND LEVEN GAS COMMISSIONERS.

Inauguration of Glover-West Verticals at Leven on Sept. 27.

The Chairman of the Gas Commissioners.

Ex.-Bailie J. Aitken.

The General Manager,

Mr. H. A. Aitken.

On Sept. 27, new Glover-West plant was inaugurated at the Leven Works of the Buckhaven and Leven Gas Commissioners. The following is a brief account of the history of the undertaking and of the new plant which has been installed to cope with ever-increasing demands for gas.

The Buckhaven and Leven Gas Commissioners are constituted under the Buckhaven and Leven Gas Commission Order Confirmation Act, 1922, and administrate the gas undertakings jointly on behalf of the Burgh of Buckhaven and Methil and the Burgh of Leven.

The area supplied was formerly served by two separate Companies, the Leven and Methil Gas Company and the East Wemyss and Buckhaven Gas Light Company. The former supplied gas within the Burgh of Leven and the eastern portion of the Burgh of Buckhaven and Methil; while the latter supplied the western portion of the Burgh of Buckhaven and Methil and East Wemyss.

Modest Beginnings.

The works of the Leven and Methil Gas Company were situated on the site of the present central works at Leven, where gas was first produced towards the end of October, 1837. The Company started with a capital of £800. The works of the East Wemyss and Buckhaven Gas Light Company were situated along the foreshore between Buckhaven and East Wemyss, outside the boundaries of the burgh. They were brought into operation in 1846.

The extensive development of the mining industry in the district, and the increase of coal exports from the docks have been followed by a rapid growth of the consumption of gas within comparatively recent years. Both companies had raised additional capital from time to time, and made improvements and extensions of plant to cope with the increasing demand; and when the respective burghs of Buckhaven, Methil, and Innerleven had been amalgamated as a Joint Burgh, steps were taken to obtain municipal control of the gas undertaking. For this purpose the Burgh of Buckhaven and Methil adopted, in 1914, the Burghs Gas Supply (Scotland) Act; and as the gas supply to the burgh had been provided in part by the two separate Companies, it was found expedient to acquire both gas undertakings.

Acquisition of the Two Undertakings.

Delay was, however, occasioned by the intervention of the war; and after protracted negotiations, the two undertakings were acquired by the Buckhaven Town Council in 1920, after which, the Leven Town Council having taken action under the same Act, it was agreed that the gas undertakings should be acquired and administered jointly by a Commission for and on behalf of the Burgh of Buckhaven and Methil and the Burgh of Leven, with the result that the above-mentioned Act was passed in 1922 to define the powers of the Commissioners.

Rapid Development.

During the following years considerable developments have taken place in the two burghs. Under several municipal schemes 1250 houses have been built, in addition to a large number constructed by private enterprise; and it soon became necessary to consider the extension of the gas-making plant to meet the new and growing demands.

The following statistics indicate the growth of the demand over the last twenty years:

Year.	Quantity of Gas Manufactured, C.Ft.
1907-8	45,652,000
1913-14	89,752,000
1921-22	93,431,000
1926-27	110,741,000

The Gas Commissioners had to take into account the insufficiency of the supply to certain areas in the district, and the inadequacy of the manufacturing plant at both works to meet the increasing demands. In spite of the already high capital burden upon the undertaking, they saw the obvious economies and general advantages to be derived from centralization of the manufacturing plant. The small ground-space occupied by continuous vertical retorts, and the low operating costs of this type of plant, led them to the decision to adopt a scheme for

The Glover-West Vertical Retort Installation at the Leven Works.

the installation of Glover-West verticals, and the concentration of manufacturing operations at the works at Leven.

The New Scheme.

The scheme included the provision of coal and coke handling plant, workshops and stores, and the necessary extensions of, and additions to, the auxiliary plant, as well as the introduction of compressing plant and the laying of a high-pressure main from the works at Leven to those at Wemyss, in order to utilize the latter as a gasholder station to serve the districts already supplied from that centre.

Compressing Plant.

The compressing plant consists of rotary compressors in duplicate, each capable of passing 25,000 c.ft. of gas per hour against a pressure of 5 lbs. per sq. in. They are each direct-coupled to steam engines, and were supplied by Messrs. George Waller & Son, of Stroud.

The high-pressure main is a 6-in. diameter steel tube, with valves inserted at intervals to provide against the results of possible subsidence along the road, such as might be caused by the mining operations within the area. Suitable governors installed in a new building at East Wemyss permit of gas being passed alternatively direct to the low-pressure mains supplying the district or to the holder for storage.

Glover-West Verticals.

The Glover-West vertical retort installation is built on a ferro-concrete raft foundation. The bench, which is capable of producing 900,000 c.ft. of gas per day, consists of twelve retorts, 25 ft. long and 33 in. by 10 in. at the top, arranged in three settings, each of four retorts, each setting comprising two units of two retorts each. The retorts are heated by means of two producers, each capable of serving two, four, or six retorts. The installation is complete with coal and coke handling plant, in the form of a West lip-bucket conveyor encircling the bench and capable of dealing with 30 tons of coal per hour. An automatic mechanical lubricator ensures constant and adequate lubrication while the conveyor is in use. The coal breaker is belt-driven and capable of dealing with 25 tons per hour. Coke is handled by the same conveyor, and is dropped direct into the buckets from the discharging doors, or can be wheeled away to the yard in barrows. The producers are fed from the coke hopper by a bogie, which is filled from a chute at producer platform level. A chute and screen are led outside the retort house for the purpose of filling carts.

The waste-heat boiler is of the natural draught water-tube type. It is capable of evaporating 1000 lbs. of water per hour from and at 212° Fahr., and is fitted with coil superheater, automatic water feed, high and low water alarm, and feed pumps in duplicate. Provision of a surplus steam valve allows all steam not used on the plant to pass through into works' steam range at 100 lbs. pressure. Should the pressure in the waste-heat boiler fall below 60 lbs., the valve allows the return of steam from works' range to the vertical plant. Exhaust steam from the extractor engines is led back into the low-pressure steam line under the bench, for steaming the retorts.

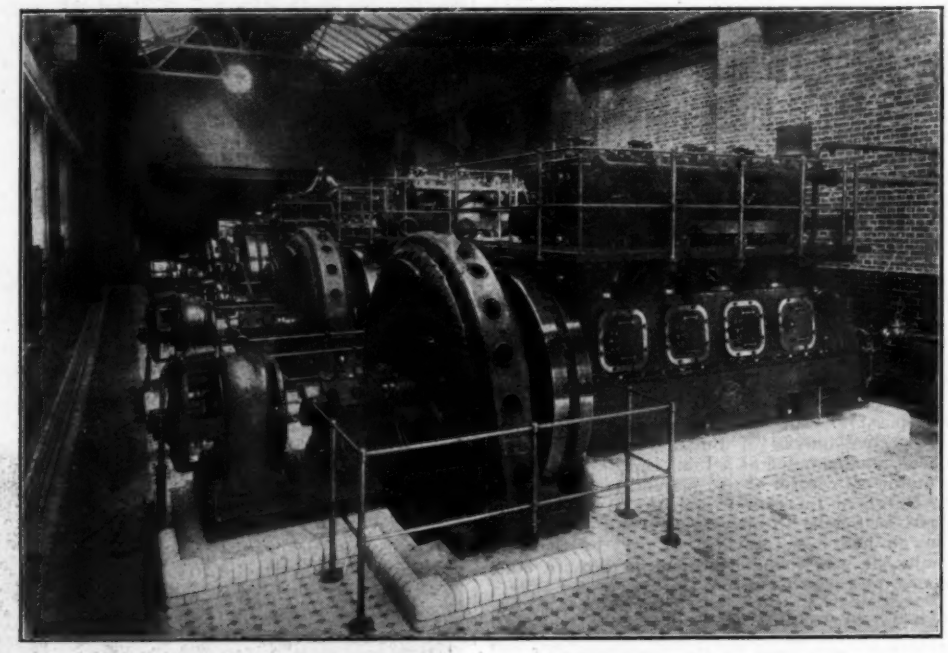
With regard to the lighting of the installation, an adequate number of three-light lamps, fitted with patent extinguishing device, have been arranged at suitable points on the plant; and the whole is controlled by a series of taps placed at convenient positions where these can be switched on or off as the plant operators proceed to or from the respective platform stages.

Erection of the Leven plant was effected under the difficult circumstances prevailing consequent upon the coal crisis. Gas-making operations were commenced on the termination of the dispute, and before normal coal supplies had become available. The coals carbonized at the outset consisted of a mixture of American and Silesian coals. Nevertheless, carbonizing operations in the horizontal plant were immediately discontinued, and the full load of the Leven Works was taken up by the vertical retort plant, and has been carried by it ever since.

INAUGURATION OF GAS AND ELECTRICAL EXTENSIONS AT ALDERSHOT.

JOINT DEVELOPMENT OF TWO GREAT PUBLIC SERVICES.

CHEAPER PRODUCTION OF GAS AND ELECTRICITY.



THE NEW GENERATING PLANT AT FARNBOROUGH.

Proof of the fact that gas and electricity can progress famously side by side and under common control was afforded on Wednesday, Sept. 28, when a large gasholder at the Ash Road Works of the Aldershot Gas, Water, and District Lighting Company, and new electricity generating plant at the Farnborough Works of the Company, were formally inaugurated.

The first part of the successful and enjoyable dual ceremony took place at the North Camp and Farnborough Works, where electrical extensions were inaugurated by Councillor A. Lord, J.P., the Chairman of the Farnborough Urban District Council.

Unique Position of the Company.

The position of the Aldershot Company is unique in that it is the only concern of its kind to which Parliament has thought fit to grant powers to supply the three important commodities, gas, water, and electricity. It is nearly twenty years since statutory powers were obtained to supply electricity; and the Company have so far centralized the generating plant at their North Camp and Farnborough Works.

The last ten years have seen developments in the supply of electricity to such an extent that the output has been increased ten times, and for 1927 is estimated to exceed 1¼ million units. The further outlook is such that, with the advent of an Extension of Area Order (now emerging, which will cover additional districts, making the total area of supply approaching 150 square miles), together with existing contracts, it is estimated that the output will exceed ten million units seven years hence.

Cheapening Production Costs.

Naturally, the possibilities of greater demands for electricity are materially influenced by the Company's works developments, inasmuch as the day-load factor is already appreciably contributed to by demands for power, &c., at the other works of the Company, whereby the cheaper production of both electricity and gas is made possible. During the ceremony, Mr. R. W. Edwards, the Chairman and Managing Director, explained that the Company realized that, for cheap production, gas should be made the servant of electricity, and electricity in its turn the servant of gas. Thus, in the new electrical plant at Farnborough, town gas was the prime agent for the generation of electricity.

The new electrical equipment consists of two additional alternators, each driven by a four-cylinder vertical gas engine of 335 B.H.P., complete with auxiliary plant and cooling tower. This plant is by Messrs. Browett Lindley & Co., Ltd., of Manchester; while Messrs. Mussellwhite & Son, of Basingstoke, were responsible for the foundations and building work, and the Electric Construction Company, Ltd., of Wolverhampton, for the high-tension switchgear.

Inauguration Ceremony.

The formal opening of the extensions was attended by a large gathering, composed of those responsible for local government, and many engineers.

Mr. Edwards explained that last winter the Company were generating their electricity under trying conditions. It was, in fact, a period of extreme anxiety, for at certain times the plant was running at full capacity; and had there been a breakdown then, there would have been serious interference with the supply. As they were probably aware, the Aldershot Undertaking was a composite one, and the Electricity Department constituted only one of three sections. It was, so to speak, the baby of the concern; and during the war it had needed a great deal of nursing. Now, however, it could be regarded as a lusty youth—good progress in a few years. The Company's policy was that of interlocking the interests of gas and electricity. As they would observe, electricity was generated by gas. The policy was a good one, for, in serving the public with the three commodities, gas, water, and electricity, they had but one sales staff. The Company were, of course, anxious to display the utmost enterprise in selling their products for the public benefit. The over-ruling principle, however, had to be one of economics; and it had to be remembered that a definite demand must be forthcoming before the Company could entail the capital expense for mains or cables. They had to consider the supply over a large area; and it was for this reason that they had adopted single-phase alternating current. He hoped the new plant would see them through for many years to come. Mr. Edwards concluded by remarking that the policy of interlocking gas and electricity services was not widely followed in this country, though it was largely adopted on the Continent and in America; and wherever it had been pursued, gas had acted as a stimulant to the sales of electricity, and electricity, in its turn, had aided the sales of gas.

Mr. Edwards then called upon Councillor Lord to start the new plant.

The New Holder.

Those present then proceeded to the Ash Road Works of the Company, where the second part of the ceremony took place—the inauguration of the new holder.

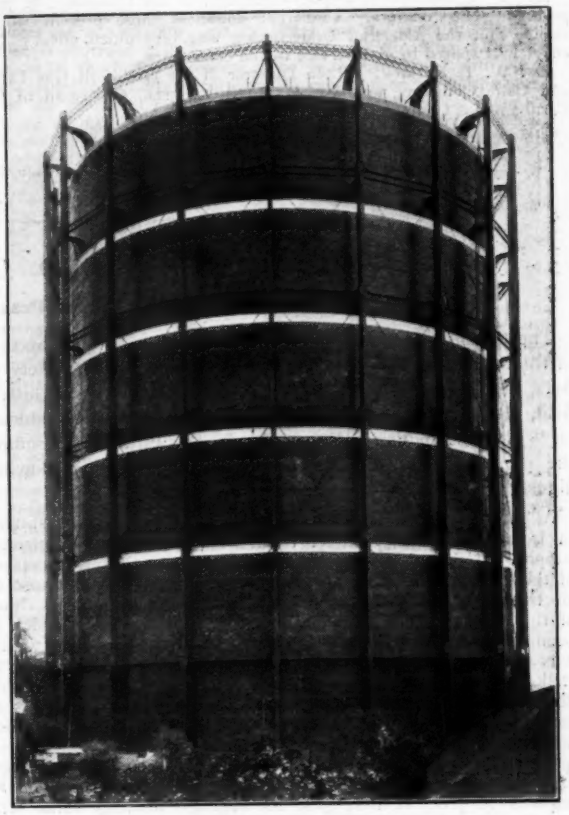
The first gas-works on the Ash Road site were erected in 1856, and were operated by a private company. They were taken over by the Aldershot Gas, Water, and District Lighting Company in 1866. At that time the area of the Company's gas supply was 4175·6 acres; to-day it is 96,031·8 acres—a brief statement of remarkable development. The Company have concentrated the manufacture of gas at this works, while other stations at Farnborough and Fleet are utilized for storage and distribution purposes. With regard to the plant at Ash Road, this is most up to date, and is designed for an estimated coal throughput of 700 tons, with provision up to 1000 tons, per diem. The annual output of gas is estimated to exceed 1000 million c.ft. five years hence.

The capacity of the new holder, the Contractors for which were Messrs. Newton Chambers & Co., Ltd., of Sheffield, is 3 million c.ft. The total height above foundations when the holder is fully inflated is 212 ft.; the capacity of the tank is 4½ million gallons of water; and the total weight of steel, cast-iron, and reinforced concrete is approximately 3000 tons. The material throughout is not stressed beyond about one-quarter of its breaking value.

"End of Chapter 1."

Mr. Edwards said that the completion of the holder marked the end of Chapter 1 of the Company's book of progress. It was a step in the scheme of general works reconstruction—the mass-concrete foundation of business on which to build greater sales of gas. The holder had a capacity of 3 million c.ft., and was a much-needed addition. Some years ago, observed Mr. Edwards, the late Sir George Livesey, in reply to a statement that a gasholder was ugly, had remarked that a thing of utility was a thing of beauty. Whatever the truth of that statement, it was a fact that, from an engineering point of view, their new holder could be regarded as a beautiful structure.

The Mayor of Aldershot (Councillor E. A. Underwood, J.P.) then opened the outlet valve of the new holder. In doing so he paid a tribute to the good work which Mr. Edwards had performed as a member of the Aldershot Borough Council.



The New 3-Million Gasholder at the Ash Road Works.

LUNCHEON.

Subsequently the visitors were entertained by the Company at luncheon.

Following the Loyal Toast,

Mr. Edwards, who presided, proposed "Public Authorities." For a long time, he said, the Company had laboured at a task which they felt to be the right one; and now that they had reached a certain stage in their programme of development, they had thought it most appropriate to invite their friends to rejoice with them. As he had remarked previously, the task had required courage; and that day represented the end of Chapter 1 of the undertaking's reconstruction. The war was a period of dislocation; and when it was over they were faced with the problem of disentangling themselves from their difficulties. They realized that, unless a bold plan were adopted, and unless they possessed the goodwill and co-operation of the public authorities, the position would rapidly become hopeless. He believed, however, that they had the sympathy of the public authorities within their area. ["Hear, hear."] And they were particularly encouraged that day because they felt they had reached a stage when these public authorities were even more appreciative of what the Company did than was formerly the case. It was indeed a pleasure to have with them the Chairman of the Farnborough Urban District Council. Aldershot, said Mr. Edwards, was going to be a centre of gravity for business, and Farnborough would be the residential district, the bedroom of the Aldershot Command. Already Farnborough was the centre of gravity for the generation of electricity. The extensions which had been inaugurated that day would, he thought, go a long way to develop Farnborough and the outer districts. The Aldershot Gas, Water, and District Lighting Company were determined to go ahead, and they were sinking much capital in plant and mains. It was a great compliment, too, to have with them the Mayor of Aldershot. The new holder represented the outcome of years of patient effort. At Farnborough, gas was the servant of electricity. At Aldershot, electricity was the servant of gas, for practically all the mechanical operations of gas manufacture—such as coal conveying, coal breaking, coke screening, &c.—were carried out by electricity.

Presentations.

At this stage Mrs. Edwards presented Councillor Lord and Councillor Underwood with models of the new gasholder, to serve as tobacco jars, and expressed the hope that they would live long to enjoy many smokes.

The Mayor of Aldershot, having expressed his thanks for the gift, said how pleased he was to rejoice in the success of the Aldershot undertaking—which success, he felt sure, was in large measure due to the energy and ability of Mr. Edwards. The progress of the Com-

many during recent years had been enormous, and constituted a great benefit and a blessing to the neighbourhood.

Councillor LORD also returned thanks.

"THE VISITORS."

Mr. T. A. BRADDOCK, Deputy-Chairman of the Company, in proposing "The Visitors," said that doubtless those present would realize that the Aldershot Undertaking was very much alive. No effort was spared to give service to the consumers.

Mr. W. T. PATRICK, J.P., a Director of the Guildford Gas Light and Coke Company, and Mr. E. F. CRUNDWELL, Chairman of the Farnham Gas Company, responded to the toast.

"ENGINEERS AND CONTRACTORS."

Mr. EDWARDS, proposing the toast of "Engineers and Contractors," remarked that Mr. A. V. Barraclough, the Chief Engineer of the Company, who was responsible on the technical side for gas, water, and electricity, had given of his best to the concern; and the Board had the utmost confidence in him. They had also had the assistance of an eminent gentleman in Mr. W. A. Tookey, who, apart from his qualifications as an engineer, was a most charming man. Then, with regard to the Contractors, the Company had had the services of Mr. T. V. Miles, the General Manager of Messrs. Newton Chambers & Co., Ltd.—a firm of world-wide repute—and of Mr. F. C. Gibbons, Chairman of Messrs. Browett Lindley & Co., Ltd., whose work at Farnborough was sufficient testimony to their skill and thoroughness.

Replies by Messrs. BARRACLOUGH, TOOKEY, MILES, and GIBBONS, concluded the speeches; and thereafter the guests were entertained to a musical programme which was greatly enjoyed.

MR. BUTTERFIELD ON THE GAS INDUSTRY.

Past, Present, and Future.

The Opening Meeting of this session of the London Section of the Society of Chemical Industry was held at the Society of Arts, last Monday, when the Chairman, Mr. W. J. A. Butterfield, M.A., F.I.C. (one of the Gas Referees), gave an address on "The Gas Industry; Past, Present, and Future." Pending the publication of a fuller account, we give the following digest.

Among public utility services, the gas industry, which started in London in 1812, is older than the railways and electricity supply. It operates with less outstanding capital than either of them, yet its receipts are considerably greater than those of electricity undertakings, and more than half as much as those of the railways. It is the only public utility service which is fundamentally a chemical industry, and the only one which was not interrupted, more or less generally, by the general strike and the miners' stoppage of last year. It achieved this distinction through its preparedness in the matter of stocks of coal and oil, and the prevalence of co-partnership schemes among its employees.

Official testings were made throughout the troubles of 1926 on over 70 p.ct. of the gas supplied in Great Britain; and as regards 70 p.ct. of that gas, its average heating value was found to be as high as it should be in normal times. In respect of a further 20 p.ct. the deficiency in heating value in any quarter did not average as much as 5 p.ct. Bearing in mind the cessation of the customary supplies of coal for many months, the gas industry achieved a remarkable record of public service in 1926.

Reproductions of record-sheets of continuously operating calorimeters, and summarized results of other official testings (thrown upon the screen) indicated that the therm system of charging for gas supplied has tended to reduce the proportion of non-heating constituents in the gas, and to promote regularity in its heating value.

Gas from coke-ovens should, said the lecturer, be more extensively utilized for public gas supplies; but the coke ovens concerned should be taken over by the gas undertakings, in order that they may not be involved in colliery labour disputes, and the public service thereby placed in jeopardy.

Gas is being used increasingly for industrial heating. For example, two contiguous works belonging to a single firm, and in reality constituting one premises, consumed over 89 million c.ft. of town gas in 1926. The service pipe to one consumer's premises is no less than 14 in. in diameter.

For street-lighting, the self-diffusing effect of the gas mantle gives it a great superiority over unobscured electric lamps, the high point-like intensity of which causes them to arrest the attention of drivers, who are then apt to overlook objects in the roadway. The growth of electric street-lighting in certain areas may be associated with the fact that the public lighting authority is usually the local authority, and that seven-elevenths of the electricity sold in the country is supplied by local authorities, who manufacture only four-elevenths of the gas. In such circumstances, and especially when the borough electrical engineer is given the position of public lighting engineer, gas does not obtain, as it should on merits, a virtual monopoly of street lighting.

Gas supply should be extended more rapidly to rural districts, and electricity, where required, generated locally from it or from oil, instead of being carried by overhead high-tension transmission lines, which are a menace to airmen and others. There is irrefutable evidence of a more insistent and general demand for gas than for electricity supply. In Great Britain 8¾ million premises have gas supplies; and reckoned on the heat, or potential energy, basis, the increase in the consumption of gas in the years 1922-25 was 2½ times the increase in the consumption of electricity.

The gas industry, besides being itself one of the oldest and largest chemical industries of the country, is the fountain-head from which other chemical industries originate.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Manner of Working Water Gas Plants.

SIR,—It is generally recognized that the quantity and quality of the gas issuing from a water gas generator during the "run" period is in greatest measure affected by the prevailing temperatures of the fuel in the generator.

By working water gas plants to a time cycle, due to variation of conditions inside the generator, wastage is bound to occur. It occurs either through prolonged air blast (ventilation) resulting in an undesirable high temperature, and consequent burning away to atmosphere of the fuel in the generator; or through prolonged steaming (gasmaking "run") resulting in uncondensed steam passing with the gas to the condensers, due to the temperature of the fuel in the generator being insufficient to dissociate the steam and effect the necessary combination with the carbon of the fuel, to produce gas.

To my mind, then, everything points to the fact that water gas generating plants should be worked on a temperature cycle; the air blast being prolonged up to the point where the fuel in the generator has reached the predetermined maximum economic temperature, and the steaming being prolonged from the finish of the air blast to the point where the fuel in the generator has reached the predetermined minimum temperature. Both these temperatures should be derived from exhaustive initial tests of fuel combustion and temperature during the air blast, and of the temperature of the fuel, and the water vapour content of the gas made, during the "run."

One way of accomplishing this object, which I hope to put in practice, is by the introduction of a suitable pyrometer in the fuel bed in the generator—say, for example, three protected thermo-couples spaced apart, in order to give a mean temperature—attached to a temperature recorder. The pen of this recorder, while producing the chart, would also in its traverse make contact with three alarm lamps (red, green, and white) on a low-pressure circuit at the maximum, mean, and minimum temperatures.

As the operator saw the lamps illuminate, so he would open or close his valves. Thus, with the red light, he would shut-off his air blast, and open forward "run" steam. With the green light, he would reverse his steam run; and with the white light he would shut-off the steam and open the air blast. It is conceivable that, as well as lighting the lamp alarms, the pen contacts might lead to electrically-operated air, steam, and stack valves, and so make the plant an automatically operated one.

The plant would thus be operated on a temperature cycle, worked to temperatures which have previously been ascertained to give maximum economical working, and would result in:

1. More gas per pound of fuel to the generator.
2. More gas per pound of steam to the generator.
3. No condensation losses due to unconverted steam.
4. Less dust in the gas.
5. Less dust through the stack valve.
6. No differences due to variation in steam and air blast pressures.
7. Less repair to generator linings.

Opinions of readers of the "JOURNAL" would do much to elucidate a problem of control which, once solved, would, I submit, be of great value in the development of water gas plants.

W. S. STREDWICK.

3, Upwood Road,
Lee, S.E. 12, and
The Primitiva Gas Company of Buenos Aires, Ltd.
Sept. 30 1927.

REGISTER OF PATENTS.

Heating Coke Ovens.—No. 263,817.

STILL, C., of Recklinghausen.

No. 32,556; Dec. 23, 1926. Convention date, Dec. 28, 1925.

This invention relates to gas-fired furnaces, for heating coke ovens, and is intended for the use of various kinds of heating gases (poor gas or rich gas). The furnaces are arranged to be operated so that when poor gas is employed the heating gas and the combustion air are preheated, whereas with rich gas only the air is preheated. The furnaces are provided with two separate groups of heat recuperating and regenerating devices, and the arrangement is such that when poor gas is employed one group of recuperators serves for the preheating of the gas, and the other group for preheating the air. On the other hand, when rich gas is employed, the group of recuperators that served for preheating the gas is now used wholly or partially (in addition to the air preheating group) for preheating the air. Thus all the recuperators may be employed for preheating the air.

In known furnaces of this type, states the patentee, when one group of recuperators is changed-over from preheating the gas to preheating the air, the air thus preheated has been conducted to and distributed in the combustion space through the same supply and distributing passages used previously by the preheated gases. The present invention is distinguished by the essential feature that, under all working conditions, whatever kind of gaseous fuel is used and whether the air is preheated in one group of heat recuperators alone or in both groups, each of the different heating fluids—*i.e.*, air, poor gas, or rich gas—is always conducted through its own system of distributing passages leading to the combustion places; these passages being used exclusively for that fluid.

Geysers.—No. 275,756.

HUDSON, J. J. C. & G. C., both of Wimbledon.

No. 14,377; June 7, 1926.

This invention has for one of its objects the provision of an apparatus which is highly efficient by reason of the large surface exposed to the heating gases, and cheap manufacture, and which may, if desired, be made to attach directly to an ordinary faucet or water tap. The geyser comprises a relatively narrow, flat, and substantially vertical water heating chamber, one wall of which has fixed therein a series of separate solid heat-conducting pins which project in the path of the hot gases from a burner located near the bottom of the chamber.

Fig. 1.

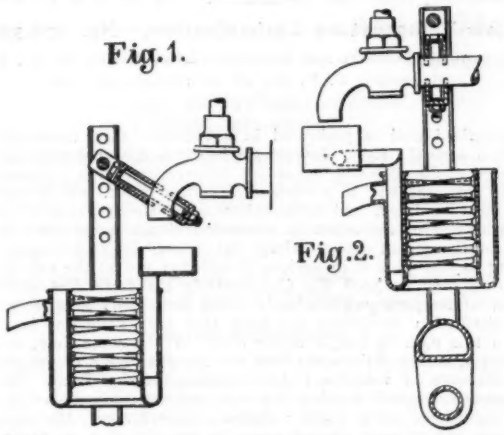


Fig. 2.

Hudsons' Geyser for attachment to Water Tap.

It may comprise a pair of relatively narrow water heating chambers arranged substantially vertically and separated by a space forming a flue for the hot gases from a burner suitably disposed below the chambers; a plurality of separate solid heat-conducting pins being fixed to the inner walls of the chambers and projecting so as to intersect in the space between the chambers, to break up the flow of hot gases and divert them along tortuous paths. Open connections between the chambers are preferably provided, to allow circulation of the water.

Figs. 1 and 2 show two methods of attaching the geyser to an ordinary tap.

Burners for Solid Hotplate Cookers.—No. 275,845.

HADDAN, R., of London.

[A communication from Moffats, Ltd., of Weston, Ontario.]

No. 31,586; Dec. 13, 1926.

The object of this invention is to provide simple means for causing an auxiliary supply of preheated air to flow to burners having a plurality of radially directed tips. The auxiliary air supply is so constructed that the air may flow freely from one part of the burner to another. The burner comprises a mixing pipe extending laterally from, and communicating with, a star burner. It is provided with a chamber communicating, by means of an air duct, with the atmosphere, thus forming a conduit extending along the underside of the pipe and tips. Openings are provided for directing a flow of air to the tips; and the pipe is inclined upwardly from its air entrance end to the end near the tips.

Preferably the burner is formed of a single piece of casting having two cored passageways arranged one above the other. The upper one forms the mixing pipe, and the lower one the conduit. The air chamber is provided with a central passage for directing a flow of air upwardly through the central space in the ring, and with openings contained in the angles between adjacent burner tips. The outer wall of the chamber lies, preferably, below the horizontal plane of the upper surface of the ring which is below the upper surface of the burner tips. The air is thus caused to flow freely, through the gaps between the adjacent tips, from the central air passage to the outer air openings.

Enriching Water Gas.—No. 276,065.

GIBSON, J. W., of Launceston.

No. 12,660; May 17, 1926.

The liquid fuel or other like enriching medium, such as crude or waste oils, is first introduced into a device in which it is mixed with the steam, and from which the mixture of steam and enriching medium passes through a superheater and is then introduced into the generator or producer, preferably at the base of the fuel bed. The superheater may have the form of a long **U** turned horizontally and arranged about half way up the producer. Whereas hitherto the usual method of carburation by oil has necessitated the employment of two separate vessels—*i.e.*, superheater and carburettor—it is proposed to eliminate the carburettor and the step of carburation and enriching subsequent to gas production by the employment of the new devices, thus saving in initial costs and obtaining a resultant gas of a more or less permanent nature.

The mixing device and the plant generally are illustrated in the specification.

Coal Washing Plant.—No. 276,382.

THE ILLINGWORTH CARBONIZATION COMPANY, LTD., of Manchester, and ILLINGWORTH, S. R., of Radyr.

No. 5062; Feb. 22, 1926.

The process involved in separating the coal from the shale, &c., is to treat it in a liquid of a specific gravity greater than that of the coal, but less than that of the shale. The coal floats on the liquid, while the other constituents separate and sink to the bottom. After separation, the liquid adhering to the separated coal and other constituents is evaporated, and the resultant vapours are condensed and returned for use in the separating process. The material to be treated is fed to a separating tank in which it is agitated; the coal and the separated constituents being removed by conveyors. The liquid employed may be chlorinated hydrocarbon having a specific gravity varying from 1·2 up to 1·8. When desired, coal so washed can be at once coated with pitch, thus rendering it ready for briquetting.

Recovery of Phenol, &c., from Gas Liquor and "Devil" Liquor.—No. 276,393.

SHADBOLT, S. M., and THE CHEMICAL ENGINEERING AND WILTON'S PATENT FURNACE COMPANY, LTD., both of Westminster.

No. 9523; Dec. 1, 1926.

This invention has for its object an improved process for the recovery of pyridine, phenols, oils, and other like bye-products from gas liquors and from the residues, such as "devil" liquor, resulting from their treatment.

The gas liquor is distilled in the presence of solvent oils, such as benzine, benzene, paraffin, naphtha, creosote, solvent naphtha, and similar oils; these being added at any convenient stage prior to distillation, or in the distillation still itself. The oils may be added to the ingoing gas liquor just before it enters the liquor heater; the mixture of oils and liquor being preferably caused to pass through any known type of mixing device, so as to bring the mixed liquids into intimate contact before proceeding to the liquor heater, and thence being caused to pass through the distillation plant in the usual way.

The oils may also be added to the liquor while it is in the distillation still itself, to assist the extraction by taking advantage of the action of the hot vapours, ammonia, carbon dioxide, and hydrogen sulphide, formed during the distillation, which facilitate the liberation of phenols and pyridine to a considerable extent, and therefore enhance their absorption. It is stated that as much as 97 p.ct. of these constituents can be extracted instead of 40 to 50 p.ct. hitherto found practicable. The recovery of the phenol, &c., may be assisted by adding some of the oils mentioned to the saturator.

The hot waste liquor and vapours leaving the saturator of the plant are led first into a heat economizer, where a portion of their heat is transferred to the incoming liquor on its way to the plant, where they are correspondingly cooled. They pass then into a condenser, where the temperature is further lowered, and further condensation takes place, and thence, in some cases, through a water-scrubber; the resulting water and condensate, usually called "devil" liquor, passing by gravitation into a condenser and thence to a receiver. According to this invention, the vapours may be further treated for the recovery of pyridine, phenols, and oils, by being brought into intimate contact with spirits or oils, such as benzene, naphtha (crude, solvent, or heavy), creosote, benzine, or paraffin. These are added to the hot gases as they enter the superheater and the condenser, are vaporized by being brought into intimate contact

with the hot vapours, and thus absorb the pyridine, phenols, &c., contained in the vapours and condensate.

The mixture of devil liquor oils and bye-products is then passed to a separator, either of the continuous or intermittent type, where the products separate from the liquor by gravitation. The various extracted products are passed to a storage tank for further treatment. The treated "devil" liquor can now be either run to waste or returned to the plant for further treatment. The final waste liquor passes away from the plant free from pyridine, phenols, &c., in a condition suitable for running into drains, &c. The final recovery of the products is effected by distillation.

By this method, state the patentees, purification can be performed along with the ordinary operation of the ammonium sulphate plant, without any special plant, except a separator and receiver for the bye-products, and without additional labour, as the whole apparatus can be operated by the same number of men who hitherto have worked the plant.

Prolonging the Life of Furnace Linings.—No. 276,410.

TOOGOOD, H. J., and ROBERT DEMPSTER & SONS, LTD., both of Elland.

No. 12,543; May 17, 1926.

This invention relates to means for prolonging the working life of the refractory materials composing furnace linings, and is intended for use in gas producer furnaces in which steam and air passes between the grate bars, with a view to maintaining the combustible content of the final producer gas at the highest, and the temperature of the coke below the fluxing-point of the ash. In such producer practice, the wear of the furnace linings is due to several distinct causes. First, the steam or water vapour in the vicinity of the heated furnace linings, after passing the grate bars, has little injurious effect on the bricks, but tends to disintegrate the jointing material between them. Secondly, and further removed from the firebars, a zone of intense heat is set up as the heated air rapidly combusts with the coke, giving rise to clinker formation actually adhering on a portion of the lining. This not only destroys a portion of the brick material, but causes mechanical injury to the lining in the removal of these clinkers. Thirdly, and still further removed from the firebars, is a zone still larger, wherein the lining, though remaining smooth over a relatively large area (so smooth that joints become invisible), suffers from the surface erosion or corrosion, or incipient fusing due to chemical reaction of the newly-formed or forming water gas, probably caused by some reaction of the steam during disassociation. If no steam or water vapour is used, then the primary combustion of the carbon of the coke and oxygen of air is so intense that the inherent ash in the coke is fused to clinker, and the whole area of the grate becomes clinkered up, upsetting the formation of producer gas and necessitating arduous labour for its removal; and damage to linings is increased. Therefore, steam or water vapour may be considered but a partial remedy, inasmuch as it finds alternative utilization of the sensible heat arising from combustion of air and coke, to form water gas rather than dense clinkers, whence the amount of clinker is reduced, to the advantage of economic gasification of coke and the life of the linings. The limit of the quantity of steam or water vapour is soon reached, for, if too much be used, the temperature of the incandescent coke falls below that at which the conversion of the required quantity to CO can take place, whence impoverished producer gas would follow.

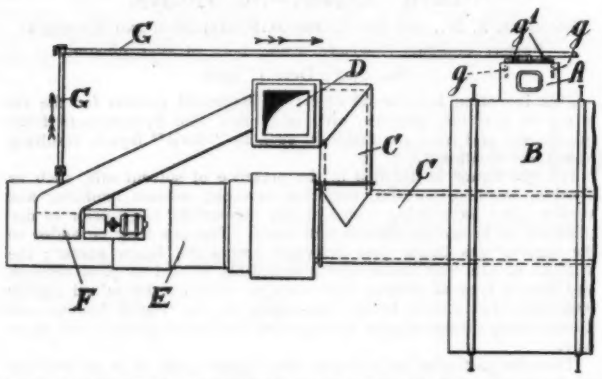


Fig. 1.—Toogood and Dempster's Device Applied to Producer Plant with Waste-Heat Boiler.

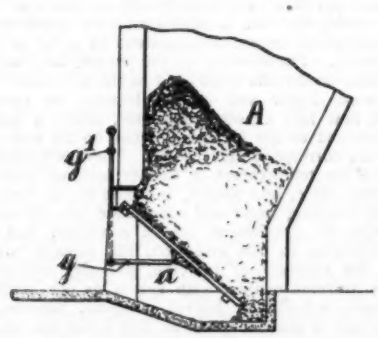


Fig. 2.—Section of Producer Furnace.

According to this invention, while retaining the normal use of steam or water vapour generally over the grate area for the economical production of producer gas having a high combustible content, waste flue gases are introduced independently and direct to positions beneath the grate of the incandescent fire in such manner that the introduction of these gases is restricted to the parts of the grate adjacent to the heated furnace linings at the sides of the furnace. Thus the steam is replaced in the proximity of the heated furnace linings, to reduce the sensible heat of the incandescent coke in contact with the heated linings to below the fusing-point of the ash of the particular fuel. Protective sheets are localized over the heated furnace linings, thereby preventing or reducing clinker formation in the one zone and obviating the erosive or corrosive or deleterious chemical effect of the water or steam on the linings in the other zone.

In ordinary types of retort benches the products of combustion (loosely termed waste heat) are under the pull of the chimney, whence some means must be furnished to draw-in such products from the main flue, and inject them as described. For this purpose, the patentees propose to inject a regulated quantity by means of a fan.

In modern plants where a waste-heat boiler has been installed, the cooled products of combustion on the pressure side of the fan may be tapped, and simply, and with utmost economy, piped to the furnace and controlled by a cock in a simple and efficient manner.

In the accompanying diagrammatic drawings, fig. 1 is a plan showing the invention applied to a gas producer furnace plant in which a waste-heat boiler is installed, and fig. 2 is a section of part of the furnace drawn to a larger scale.

A indicates the gas producer, B a portion of the retort bench, C the main flue, D the chimney, E the waste-heat boiler, and F the fan. In this arrangement cooled products of combustion on the pressure side of the fan are taken by way of the valve-controlled pipe G and branch pipes *g* to the furnace ash pan *a*, where they are controlled by cocks g^1. The branch pipes *g* are shown arranged adjacent to the side of the furnace, so that, independently of the main supply of air and steam or water vapour to the main area of the firegrate generally, by a shaped delivery nozzle a protective sheet is localized and controlled over each furnace lining.

In a gas producer furnace it has been proposed to introduce beneath the grate bars as a whole a mixture of air and carbon dioxide, instead of the usual water or steam, in order to prevent slagging of the fuel. It has also been proposed to inject by means of one or more steam jets a portion of the products of combustion to mix with the air under a producer grate.

In these prior proposals, the gases have been introduced through ports in the side walls of the grate, and have thus been distributed to the whole of the grate; and no means have been provided by which the introduction of the waste flue gases has been localized so as to form protective sheets for the heated linings at the sides of the furnace.

Low-Temperature Carbonization.—No. 276,522.

SYNTHETIC AMMONIA AND NITRATES, LTD., SLADE, R. E., and HARRISON, C. F. R., all of Stockton-on-Tees.

No. 25,480; Oct. 13, 1926.

Pulverized coal is preheated in a conveyor to a temperature of 100° to 200° C., either by external heating or by the passage therethrough of flue gases at the proper temperature. The preheated fuel is fed into one end of a horizontal rotary retort, which should be well heat-insulated, and is caused to travel slowly along it. At the opposite end of the retort is introduced steam superheated to 450° C. As the steam passes along the retort, its temperature falls, owing to loss of heat in various directions; and at the exit its temperature may be 300° C. Consequently the fresh fuel encounters steam at temperatures gradually rising from 300° to 450° C., and the distillation conditions are such that very little gas is evolved (say 1 to 2 p.ct. by weight of the fuel). At the same time, state the patentees, the conditions are ideal for the distillation of the coal and the recovery of valuable organic compounds therefrom. The first comparatively gentle heating in steam produces compounds that might be cracked by even slightly higher temperatures. Moreover, the vapours are at once carried away in the direction of diminishing temperature, so that they are at once stabilized.

The rate of fuel feed through the retort can be so correlated with the quantity of steam passed that practically all the volatile compounds can be extracted from the coal—that is, over and above the usual 10 to 15 p.ct. of volatile matter normally left in low-temperature carbonization semi-coke which has not been submitted to temperatures higher than about 450° C. The semi-coke produced in this process, containing like quantities of volatile matter, is claimed to be a valuable smokeless fuel.

The gaseous products of the process leaving the retort at a temperature of (say) 300° C. are then treated for the condensation of the organic compounds. The temperature of the gases is first reduced to about 150° by injecting a small quantity of water, which is all vaporized. The gases are then scrubbed with oil at a temperature of (say) 140° to 150° C., whereby the greater part of the condensible constituents is removed. The oil used for scrubbing may consist of the higher fractions of the oil produced in the process itself. In any case the scrubbing oil, mixed with a variety of organic compounds, is submitted to distillation, preferably under reduced pressure, to recover the organic compounds contained therein. After the removal of these compounds, the residual steam, still well above 100° C., is sent back to the superheater to be used again. As the quantity of permanent gases in the steam accumulates, it becomes necessary to purge away a portion of the circulating gas. The purging may also be effected continuously so as to keep the proportion of permanent gas in the circulating steam at a constant value. The purge gas is treated for the recovery of light hydrocarbons.

Catalysts may be introduced into the reactant material—*e.g.*, iron oxide with or without an admixture of alkali may be mixed with the initial carbonaceous material.

Carburetted Water Gas from Coal.—No. 276,530.

MISCH, O., of Frankfort.

No. 28,035; Nov. 8, 1926.

This invention relates to the generation of carburetted water gas from coal in a plant consisting of a retort superimposed on a water gas generator. Water gas is used to heat the retort, and is burned under pressure in a jacket surrounding the lower end of the retort, so that the temperature of this lower end is raised to about 700° C. or more. Thus fuel which passes into the water gas generator is entirely freed from oil or tar, and is sufficiently solidified to enable it to pass easily into the generator. Above the water gas burners is a cooling space in the form of a jacket-shaped steam generator or steam superheater. With this cooling space it becomes possible to maintain the higher situated zones of the retort, and thus the freshly charged fuel, or the fuel which is still in the distillation period, at a temperature best suited for the decomposition of the tar which is eventually injected.

The blow gases produced may be utilized for heating the retort for the generation of steam, or for drying or preliminary heating of coal, oil, or tar.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 21.]

Nos. 23,883—24,560.

BECKER, A. C.—"Gas pressure regulator for street lamps." No. 24,095.
HARRISON, F. J.—"Apparatus for handling coal." No. 24,116.
HARRISON, J.—See Harrison, F. J. No. 24,116.
HARRISON'S (LONDON), LTD.—See Harrison, F. J. No. 24,116.
HELPS, A. M.—"Gas fires." No. 24,061.
JEZLER, H.—"Generating streams of gas by combustion." No. 24,122.
KING, J. G.—"Treatment of coal." Nos. 24,518, 24,519.
LANDER, C. H.—See King, J. G. Nos. 24,518, 24,519.
LEEK, A. E.—"Treating coal." No. 24,403.
LIVINGSTON, A.—"Device for bending pipes." No. 24,032.
METERS, LTD.—"Gas-meters." No. 24,106.
MULHOLLAND, J.—"Gas injectors for burners." No. 24,239.
PEARSON, J. B.—See Harrison, F. J. No. 24,116.
SCOTT, A. A.—"Gas heating burners." No. 24,249.
SCOTT, E. H.—See Scott, A. A. No. 24,249.
SCOTT, P. R.—See Scott, A. A. No. 24,249.
SEYD, F. O.—"Gas radiators." No. 24,432.
SIDES, H.—See Meters, Ltd. No. 24,106.
SINNATT, F. S.—See King, J. G. Nos. 24,518, 24,519.
TRENT PROCESS CORPORATION.—"Dissolving coal." No. 23,992.
TRENT PROCESS CORPORATION.—"Treating coal." No. 23,993.
TULLY, A. V.—"Gas generators." No. 24,016.
WADE, H. (Schur & Theumer).—"Automatic safety devices for gas-consuming apparatus." No. 24,365.
WADE, H. (Schur & Theumer).—"Devices for lighting gas burners." No. 24,366.
WIGAN COAL AND IRON COMPANY.—See Leek, A. E. No. 24,403.
WRIGHT, S. L.—"Dip-pipe seal for horizontal retorts." No. 24,424.

[Extracted from the "Official Journal" for Sept. 28.]

Nos. 24,561—25,282.

BEARD, J. F. H.—"Gasholders." No. 24,870.
JOHNSON, J. M. A.—"Low-temperature carbonization of fuels." No. 24,645.
LEE, C. B. B.—"Gas fires." No. 25,152.
LILGE, F.—"Gas burners for furnaces." No. 25,019.
MILBOURNE, R. J.—See Beard, J. F. H. No. 24,870.
PEASE & PARTNERS, LTD.—"Doors for coke ovens." No. 25,160.
STEPHENSON, G.—See Pease & Partners, Ltd. No. 25,160.
TRANT, A.—"Gas fires, ovens, &c." No. 25,202.
TREFOIS, L.—"Continuous surface combustion stoves." No. 25,134.

MISCELLANEOUS NEWS.

INSTITUTION OF GAS ENGINEERS.—EXAMINATIONS IN GAS ENGINEERING AND GAS SUPPLY, 1927.

Abstract of Examiners' Report.

GAS ENGINEERING—ORDINARY GRADE.

College Examinations.

These papers show a marked variation in the standard of the schools represented, both in regard to the difficulty of the questions asked and the length of time required to give a reasonably complete answer. The general standard of the answers is an advance on previous years; but there is much room for improvement in clearness of statement, spelling, handwriting, and sketching. It is only fair, however, to state that in several cases the standard is quite satisfactory.

External Examinations.

In the external examinations in Ordinary Grade Gas Engineering, generally speaking the questions were answered in a satisfactory manner, considering the age and experience of the candidates and the other work which they were also doing in cognate subjects at the same time as they were gaining instruction in gas engineering.

With one or two exceptions, the sketches made by the candidates were poor. The few exceptions, however, were very good indeed. Generally speaking, the poor quality of the sketches was responsible for the loss of a large number of marks. This will be emphasized when it is mentioned that in a question such as No. 1, for instance, "Sketch and describe any well-known form of mechanical scrubber used for the removal of ammonia," 50 p.ct. of the marks were allotted for the sketch, and 50 p.ct. for the description.

Some of the candidates, also, were far too verbose in their descriptions—much shorter descriptions would have answered the questions quite satisfactorily. This resulted in candidates having insufficient time to complete their paper. Some candidates either misunderstood some of the questions or were not sure enough of the answers, so proceeded to write-out long descriptions of something which they imagined would persuade the Examiner to give them some marks, although what they wrote was not an answer to the question.

ADVICE TO CANDIDATES.

The Examiner submits the following advice to candidates for the Ordinary Grade, which is applicable to all.

(1) Read carefully the whole of the questions on the paper before attempting to answer any of them.
(2) Decide which questions you can most quickly and easily answer, and attempt those first.
(3) Before commencing each question, read it through again carefully, and make sure that the answer you are giving is an answer to the question.
(4) Leave questions the answers to which you feel require longer and more involved statements until the last.
(5) Give sketches wherever asked for, and, in addition, whenever a sketch will help your description. Make these as neat and accurate as possible, giving essential details; but do not over-elaborate them. If you wish to colour the sketches, wait until you have completed all your questions before doing so. It is much more important to answer six questions than to over-elaborate sketches. Provided a sketch is neat and shows essential details, it is all that is required.

GAS ENGINEERING—HIGHER GRADE.

The quality of the work in this grade this year was an improvement on the three previous years; and it would appear that the greater knowledge of the cognate subjects obtained by the students has had a beneficial effect in the improved tone of the papers.

It is noticeable in this grade that more attention has been paid to the matter of sketches; but there is still considerable room for improvement in this direction.

In this stage, it will be remembered that only candidates passing first class are eligible for the examination for the Diploma; and the line of division between the first class pass and the second class pass in this grade is therefore very carefully considered. It may be safely assumed that a candidate passing first class has fully earned it not only by showing a decided grip of the subject, but by reasonable sketching and ability clearly to endorse his reasons.

DIPLOMA IN GAS ENGINEERING.

In regard to this examination, the written papers proved rather disappointing, although the sketches showed a decided improvement on those of previous years.

Taking the answers in sequence, the question on oil gas was not well answered, and insufficient knowledge was shown of the essential factors for the efficient production of oil or carburetted water gas, representing, as it probably does to-day, in many works, some 30 p.ct. of the total gas made.

The question relating to waste-heat boilers was really indifferently answered; no candidates obtaining more than 45 p.ct. of the possible marks.

The question on apparatus for retort-house machinery was answered in a very casual manner, which seemed to indicate that the instruction in this respect is far from up to date.

The question on foundations (a comparatively simple engineering question) showed lack of elementary knowledge—a fact emphasized in the last report.

The replies on retort house charging and discharging machinery were too short. The main points were missed; and the attempts at enumerating and comparing the advantages and disadvantages of several types of machines were very poor.

In regard to the theses, these were not up to the standard of the

two previous years. In fact, a number of those submitted could not be described as theses at all. While nearly all the theses gave evidence of a considerable amount of time having been spent on them, there was a decided absence of original thought and investigation. Theses which could not be accepted were mainly composed of a record of the ordinary observations and methods which are usually employed in all modern gas-works, or a detailed description of plants, all of which can be seen in up-to-date text-books.

The Examiners desire to emphasize that what is wanted is the result of original thought and investigation, with all conclusions clearly and concisely summarized. It is proposed in future to publish, some months beforehand, a list of subjects from which, if he chooses, a candidate may select one for his thesis.

In concluding their report, the Examiners point out that although they offer the foregoing remarks for the guidance of teachers and students, they are desirous of adding that, generally, the tone of the work this year is an improvement on that of previous years, and that candidates are showing benefit in the manner the questions are answered, as a result of their training in cognate subjects.

Abstract of the Report of the Examiners and Assessors for Scotland.

The Examiners report that the papers are not of high standard, and the sketches are of the most elementary kind. The comments made in the report of 1926 are equally applicable to the present examination. The 1926 report referred to contained the following passages: "The general impression made upon us is that the candidates have memorized accurately certain text-book answers regarding various processes, but they have not yet made themselves acquainted with the actual construction. For example, some of the sketches were very far from accurate in arrangement. We feel that the students should use every opportunity available of examining processes and apparatus, either in operation or when the latter may be under repair."

Gas Supply—College Examinations.

In connection with the internal examinations in the Ordinary Grade in Gas Supply, the Assessor again draws attention to the poor quality of the sketches from the standpoint of draughtsmanship, and to the fact that they also appear to show that the candidates have not clearly understood the working of the apparatus that the sketches are intended to illustrate. For instance, in making a sectional elevation through a Cowan's governor, not one sketch shows clearly the relative water levels inside and outside the controlling and compensating bells.

In other respects also, with the exception of those from one centre, the papers were not good, as is shown by the high percentage of failures.

Gas Supply—Ordinary Grade (External Students).

The Examiners state that each year several of the questions set are designed to test the candidate's power to apply his knowledge of ancillary subjects to gas supply; and it is satisfactory to note that such questions were, on the whole, better answered this year than last.

Gas Supply—Higher Grade.

In the Higher Grade the Examiners regret having to report that, on the whole, the standard of attainment is still relatively lower than in the Ordinary Grade, and considerably below what is reasonable to expect of students who have taken (or have claimed and been granted exemption from a part or the whole of) a grouped course lasting five years. In many cases the sketches of appliances, &c., were poor; also there was little evidence of a proper application of the fundamental sciences to the central subject. The Examiners think that in some schools the teachers of gas supply have not yet revised their methods of teaching to conform with the new conditions. It is to be hoped that the teachers' course held recently at Westminster will be the means of effecting an improvement next year.

Analysis of Results of the Examinations in Gas Engineering and Gas Supply.

[For purposes of comparison, the corresponding figures for 1926 are given in parallel columns.]

Internal Students.

Subject.	No. of Entrants.		First Class with Distinction.		First Class.		Second Class.		Failures.		Referred to Committee.	
	1926.	1927.	1926.	1927.	1926.	1927.	1926.	1927.	1926.	1927.	1926.	1927.
Gas Engineering—												
Ordinary Grade.	55	48	3	7	6	7	16	25	30	8	..	1
Higher Grade .	27	18	1	..	3	5	12	7	11	6	..	..
Gas Supply—												
Ordinary Grade.	16	42	2	1	4	14	4	10	6	17	..	..
Higher Grade .	2	9	..	..	..	1	..	4	2	4	..	..
Totals . .	100	117	6	8	13	27	32	46	49	35	..	1

Total in all Grades 1926 = 100.
" " " " 1927 = 117.

External Students.

Subject.	No. of Entrants.		First Class with Distinction.		First Class.		Second Class.		Failures.		Application Withdrawn.	
	1926.	1927.	1926.	19 7.	1926.	1927.	1926.	1927.	1926.	1927.	1926.	1927.
Gas Engineering—												
Ordinary Grade.	23	40	2	..	11	6	5	26	4	8	*	..
Higher Grade .	12	25	2	2	4	9	4	9	2	5	..	2
Diploma . . .	7	8	2	1	1	..	1	2	3	5	..	..
	42	73	6	3	16	15	10	37	9	18	1	2
Gas Supply—												
Ordinary Grade.	19	18	..	1	7	8	5	5	7	4	..	1
Higher Grade .	3	7	..	..	..	3	2	..	1	4	..	..
Diploma . . .	..	..	..	..	..	..	..	..	..	..	..	..
	22	25	..	1	7	11	7	5	8	8	..	1
Total . . .	64	98	6	4	23	26	17	42	17	36	1	3

* Absent.

Total in all Grades 1926 = 64.
" " " 1927 = 101.

DIPLOMA RESULTS, EDUCATION SCHEME.

In the issues of the "Journal" for July 6, Aug. 24, and Sept. 21, we published lists of successful candidates in the 1927 Examinations of the Institution of Gas Engineers' Education Scheme. To complete the lists, Mr. Walter Hole, the Organizing Secretary, has forwarded the following particulars relating to the Diploma in Gas Engineering.

Year.	Number of Entrants.	First Class with Distinction.	First Class.	Second Class.	Failures.
1926 .	7	2	1	1	3
1927. .	8	1	*Nil*	2	5

EXETER GAS COMPANY.

Further Capital.

Presiding at an extraordinary meeting of the proprietors of the Exeter Gas Company on Monday, Sept. 26, Mr. John E. Daw, Chairman of Directors, moved "that the Directors be empowered to raise a sum not exceeding £120,000 under the powers authorized by the Exeter Gas Act, 1878, and the Exeter Gas Order, 1927, by the issue of either additional ordinary shares or stock, and (or) preference shares or stock, and (or) debenture stock on such terms and conditions and at such times and in such manner, subject to the restrictions contained in the said Act and Order, as the Directors may from time to time determine."

Before dealing with the resolution, Mr. Daw said that the shareholders would join with him in regret at the great loss the Company had sustained by the death of their late Chairman, Mr. G. Hardy Harris, who was widely known, and whose intellectual capacity was very high. It was largely due to Mr. Harris that the Company occupied its present satisfactory position. Recently it was felt that the Company's progress could not be maintained under existing conditions; and it became necessary to consider the best means of raising additional capital. The step they took was to apply for an Order, which was granted, and which gave them most of the terms they applied for. Under that Order the Board were now asking the shareholders for authority to raise additional capital for the work of the Company. It was no use in these days standing still; it was necessary to have the requisite amount of money to deal with new business. Their sales of gas had considerably increased. In 1924 they sold 582 million c.ft., in 1925 618 millions, in 1926 643 millions, and for the six months of this year they had recorded an increased sale of nearly 25 million c.ft. Though those were big figures, so far as the Board could see they were not final; and they anticipated that they would still be called upon to produce more gas for the people who wanted to use it.

It was not long ago that the Board asked the shareholders to authorize the issue of further capital, but that was only for the needs of the day. Now they were pledged to some considerable expenditure. They were going to provide two condensers, each of a capacity of 2 million c.ft. per day, two 150,000 c.ft. per hour exhausters, and a new station meter, and were re-arranging a portion of their works, and enlarging them. In addition to that, it had become necessary to extend their mains; and they were laying 3½ miles of ordinary mains for new houses. Furthermore, they had entered into arrangements to take over the Topsham Gas Company, which meant that they were having to extend their mains to Topsham, in order to connect with the existing works there. By the time they had done this, they would have laid about seven miles of mains.

Fortunately the returns of the Company were such that they could well provide interest on the further capital they were seeking. The position in which the Company stood in the financial world was really a good one. Their capital per million c.ft. was very low. It was only £327 per million c.ft. This showed that the policy of the Company in the past was a conservative one; and the investing public would be satisfied that the capital had a very good security. The Directors asked the shareholders to give them an entirely free hand as to the steps to be taken to raise the money.

The resolution was seconded by Mr. H. M. D. Willcocks, supported by a shareholder, and carried unanimously.

TYNEMOUTH GAS AMALGAMATION.

Provisional Agreement Approved.

At an extraordinary meeting of the stockholders of the Newcastle-upon-Tyne and Gateshead Gas Company, held on Sept. 27, resolutions were unanimously passed approving of a provisional agreement which has been entered into with the Tynemouth Gas Company for the amalgamation of the two Companies, and also approving of an application to the Board of Trade for the necessary Order under the Gas Regulation Act.

It was explained by Mr. J. E. COWEN, who presided, that the arrangements between the two Companies could not be simpler. The agreement provided for the holders of the Tynemouth Company's ordinary stocks to receive for each £100 of their stock £125 of the Newcastle Company's 4 p.ct. preference stock; the holders of the Tynemouth Company's 4 p.ct. preference stock to receive an equivalent amount of the Newcastle Company's 4 p.ct. preference stock; the taking-over by the Newcastle Company of the mortgages of the Tynemouth Company; the compensating of the Directors and the Secretary of the Tynemouth Company; and the taking-over of the other employees.

SAVINGS TO BE EFFECTED.

Pending the carrying-out of the amalgamation, the agreement imposed restrictions upon the Tynemouth Company as to the raising of capital, borrowing of money, or any extraordinary expenditure, so that virtually it would be under the control of the Newcastle Company until the date of taking-over.

He pointed out that they did not advocate amalgamation simply for the sake of making it a huge concern, but because of the advantage that would accrue to the Company, the shareholders of both Companies, and the consumers in both areas. There were, he said, various savings that could be effected in the administration—in directors' fees, auditors' fees, and eventually in engineering and chemical staffs. There would be saving in capital expenditure, in manufacturers' plant, in mains, and so on. The Chairman said that the stock of the Company had risen since it was known that the agreement was contemplated.

Mr. JACKSON, the Company's Solicitor, explaining the provisions of the agreement, referred to a clause which provides that during the first year after the date of transfer the Company's charges for gas in the Tynemouth area should not exceed 1·6d. per therm more than the Newcastle price, before deduction of discount; during the second year not more than 1·4d.; and during the third year not more than 1·2d., and afterwards not more than 1d. beyond the Newcastle price. Earsdon and Seaton Delaval are mentioned as exceptions where the price may be a little more.

TYNEMOUTH COMPANY'S MEETING.

At a meeting of the Tynemouth Gas Company held the same day, it was resolved to make an urgent request that provision should be made by the Newcastle Company's Directorate for continuity in the direct representation of the Tynemouth area upon the Board in the event of the retirement of Mr. Thomas Young, Chairman of the Tynemouth Company, who is to join the Newcastle Board upon the amalgamation.

In a speech reviewing the position, Mr. YOUNG spoke of the disadvantages under which the Tynemouth Company had been working in recent years. For some years they had made little or no progress in the sale of gas, owing to the intensive competition of electricity. A strong, powerful company like Newcastle, with immense financial resources, progressive, and one of the most highly organized bodies of its kind in the country, would be able to make and sell gas cheaper than Tynemouth possibly could, and so compete better with the rival commodity.

The present price of Newcastle gas was 8·6d. per therm, which was 3·8d. less than the maximum of 12·4d. which Tynemouth was allowed to charge. As 1d. per therm in Newcastle would show an additional revenue of £80,325 per annum, it meant that if they ever charged the full possible price, their revenue would come up by the huge figure of £305,235.

These figures went to prove the perfect security of holders of 4 p.ct. preference stock in the Newcastle Company, as compared with the somewhat uncertain outlook for the future of the holders of Tynemouth ordinary stock.

The CHAIRMAN moved the resolution approving of the amalgamation, which was seconded by Mr. ROWLAND LISHMAN, and carried.

It was on the motion of Mr. R. A. JACKSON that the proposal was carried to endeavour to secure permanent representation of Tynemouth on the Newcastle Company's Board of Directors.

BRITISH GAS LIGHT COMPANY, LTD.

Annual General Meeting.

The Annual General Meeting of the Company was held on Wednesday, Sept. 28, at the London Offices, No. 2, The Abbey Garden, Westminster, S.W. 1—Mr. HENRY WOODALL, M.Inst.,C.E. (the Chairman and Managing Director of the Company), presiding.

The SECRETARY (Mr. A. W. Brookes) read the notice convening the meeting and the Auditors' reports; and the report of the Directors and the statement of accounts for the year ended June 30 were taken as read.

The CHAIRMAN, on rising to address the meeting, said: Gentlemen,—It is again with pleasure we meet you and give an account of our stewardship.

GAS PRICES LESS THAN BEFORE THE COAL DISPUTE.

In spite of many difficulties occasioned by the deplorable coal stoppage, which started on May 1, 1926, and finished on Nov. 30, we are able to present a very satisfactory balance-sheet. You will realize that, although the coal stoppage started some two months prior to the period now under review, very little of the extra burden was felt before July of last year; and the accounts I am dealing with bear practically the whole of the extra cost. Fortunately, at the commencement of the coal dispute, we had good stocks of coal; and though for the coal we purchased from abroad we paid very high prices, we bought comparatively early and well, and on the whole the coal we received was of good quality. We were not the earliest to raise the prices of gas, and were among the first to reduce them. At our larger stations—Hull and Norwich—the price of gas has been at the pre-stoppage figure since April 1 last, and at Trowbridge and Holywell from July 1 last; and to-day the price is less at all our works, except the small station at Holywell, than when the coal dispute began.

WORKING RESULTS.

The general result of our working is that, after paying the same dividend as last year, we are able to place £10,000 to our general reserve fund, which now stands at £80,360, and increase the carry forward by £14,290. The amount carried forward to-day is £84,283, or more than double the amount of two years ago. The Hull reserve fund (£67,683) is £1633 less than at this time last year. As you will notice, we had to call on the fund to meet a slight deficiency in the Hull profits.

PURCHASE OF GAS UNDERTAKINGS.

Since our last meting the Board of Trade have granted us an Order in connection with our Norwich undertaking; and we have, partly in consequence, acquired control of several small gas undertakings situate in the new area. We are also in negotiation for the purchase of gas undertakings in other parts of the country. You will notice an item in the balance-sheet of £76,533 "Investments in other Gas Undertakings." As negotiations are not quite complete, you will not expect me to go too fully into details; but I may say that the "Investments in other Gas Undertakings" have now increased to £138,831. The necessary capital was raised by an issue of 5 p.ct. debenture stock. This stock was issued at 93 p.ct., and costs us in all just over 5½ p.ct., including the discount which has been debited to premiums on shares and debenture stock, which figure is thereby reduced to £25,977. That we are able to obtain money on what are virtually second debentures at this rate of interest, is proof that our financial position is a very sound one. Our investments in other gas undertakings bring us in a larger return than 5½ p.ct.; and the balance is to the advantage of the Parent Company.

AN ADVANTAGEOUS POLICY.

In the past we have lost some of our stations; and you will, I am sure, agree that the more widespread our interests are the better. Each of the undertakings bears its share of the cost of administration, and so every addition helps the whole concern. On obtaining control of gas undertakings every effort is made to reduce the price of gas; and we have in many cases been able to do this because we buy coal and all our requirements in large quantities, and are consequently able to purchase more cheaply. Further, we are able to give a more satisfactory supply, as we have the necessary expert staff to keep constantly in touch with the local managers. The distribution of gas over long distances is a question which is occupying seriously the minds of many competent people; and we, in our small way, are dealing with this important development. I have ventured to make these few remarks to show you what is in our minds, and the policy we are adopting.

SALES OF GAS UP 5 P.CT.

The growth of our undertaking continues. This year the sale of gas was 5 p.ct. greater than last; and when you hear that this means an increase of 139 million c.ft., you will realize that it is no negligible quantity, but is equal to the total annual gas requirements of towns such as Llandudno or Durham. The sale of gas since 1922—the year in which our Potteries Station was taken over by the Corporation—has increased at the rate of 5 p.ct. compound, which, if maintained, means that the demand for gas is doubled in fourteen years—a very substantial and satisfactory growth, which does not involve too great a strain on our resources. A rapid growth—especially if an irregular one—is not altogether easy to deal with.

HULL STATION.

Those of you who are familiar with our accounts will have noticed that the profits at Hull are less than those at Norwich—namely, £45,000 at Hull, as against £63,000 at Norwich. In Hull the price of coal has always been less than at Norwich; but during the coal stoppage the difference in cost of coal was not nearly so great. Further, residual products did not produce quite so much at Hull as at Norwich; and we only raised the price in Hull for four-and-a-half months, as against six months at Norwich and nine months at our other stations. We were able to do this because we have a reserve

fund at Hull which we felt should be used at a time such as we have passed through; and we withdrew from this fund nearly £4000 to make up deficiencies. At none of the other stations have we been able to provide reserve funds, but have some arrears of interest which have to be wiped out before reserve funds are started.

Results Increasingly Satisfactory.

You would not wish me to go into the detail working at our various stations; but I may say the results are increasingly satisfactory. Our Engineers and Managers are, as you know, able, energetic, and enthusiastic servants of the Company; and they have under them a body of assistants and men in whom they, and we, have every confidence.

Long Service.

The Pension Scheme started to commemorate our centenary is greatly appreciated. Including allowances previously granted, we have now altogether 132 pensioners; and the sense of security given to our men is of the greatest value. Last year I drew attention to the fact that 25 years' service medals had been presented since 1912 to 392 Directors, staff, and workmen. This number has now risen to 408—showing that our service is both popular and healthy.

When referring to our Engineers, I am reminded that our Senior Engineer, Mr. Thomas Glover, who was last year Lord Mayor of Norwich, only a few weeks ago lost his wife in very sad and tragic circumstances; and I am sure many of you who know Mr. Glover personally, and all of you who know how well he has served the Company, will wish to send a message of condolence and sympathy with him. ["Hear, hear."]

Sound Position of the Industry.

The position of our industry is thoroughly sound. We are better equipped year by year to make the best of our products. Never have we had better engineers and chemists. The makers of the apparatus we use are turning out plant of far higher efficiency than ever before. The manufacturer is not only more practical, but more scientific; and the result is that gas is being now used for many purposes undreamt of a few years ago. Nearly all the companies with which I am connected are increasing their output at a greater ratio to-day than for some time past. Another thing that augurs well for the future is the good relationship in our industry between masters and men. The National Joint Industrial Council for the Gas Industry has recently agreed to the stabilization of wages until June of next year. Both masters and men have chosen excellent representatives; and the meetings of the National Joint Industrial Council for the Gas Industry are in every way helpful and harmonious, and will, I am confident, remain so, at all events while we have the existing guiding hands.

I shall be pleased to answer any questions with regard to our affairs; and, in conclusion, I should like to say that the Company, in its history of 103 years, has never, I believe, been in a sounder position than it is to-day. I now have much pleasure in moving the adoption of the report and accounts.

The Deputy-Chairman (Mr. Harold G. Palmer) seconded the resolution; and there being no discussion, it was put to the meeting and carried unanimously.

The Chairman remarked that, as there were no questions asked, it might fairly be assumed that the proprietors were satisfied with the Board's management of their affairs.

The Dividend.

On the proposition of the Chairman, seconded by the Deputy-Chairman, the payment by the Directors of the dividend at the rate of 7 p.ct. per annum, less income-tax, on the cumulative preference stock of the Company, as mentioned in their report, was confirmed.

The Chairman next moved that the payment by the Directors of the interim dividend at the rate of 3½ p.ct., less income-tax, on the ordinary stock, as mentioned in their report, be confirmed, and that a final dividend on the ordinary stock at the rate of 4 p.ct.; less income-tax, making 7½ p.ct. for the year, be now declared; the same to be payable on Oct. 7.

The Deputy-Chairman seconded this, and it was agreed to.

Re-Elections.

The Chairman said he had much pleasure in proposing the re-election as a Director of Major-General W. T. Corrie, who was one of the gentlemen who had received the 25 years' service medal. As a matter of fact, he had had 34 years' service on the Board. They hoped to have him with them for many years more.

The Deputy-Chairman seconded the motion, which was carried.

The Chairman then proceeded to move the re-election as a Director of Mr. L. R. Abbey-Williams; remarking that this gentleman had not yet got his medal, but was approaching it. They all hoped he would in due course receive it. It was very useful for them to have on the Board men who, through long connection, knew so well the business of the Company.

Mr. Graham Wilkin seconded the proposition, which was agreed to.

Major-General Corrie and Mr. Abbey-Williams acknowledged this renewal of the confidence of the proprietors in them.

Services of the Board.

Mr. W. A. Surridge said it was his intention to move a resolution of which he had given notice to the Secretary; but before reading its exact terms, he wished to say a word or two in explanation of his action. He had known the Company for a good many years as confining their activities to four or five works only. But of late an entire change had come over the policy of the Board; and, in accord with that spirit of amalgamation which seemed to be now everywhere abroad, they were acquiring other undertakings. The Chairman had spoken of those so acquired. He (the speaker) had knowledge of some of them; and he knew that in this business a very large amount of time had to be spent in visiting the works. He imagined that in the future a still larger call would be made upon the Directors, not only in the matter of responsibility, but in the matter of time devoted to travelling to the various works. He therefore proposed that:

> "In exercise of the power for this purpose reserved to the Company by Article 85 of the Articles of Association, it is hereby resolved and directed that, in addition to the remuneration and out-of-pocket expenses now paid to the Directors, such further annual sum as, after deducting the income-tax for the time being chargeable thereon, shall be equivalent to a net sum not exceeding £1000 in any one year be paid to them as remuneration for visits paid to the Company's stations or to other stations or works in which the Company is interested; and that such annual sum shall be divided between the Directors as they may mutually agree."

In view of the very satisfactory report we have before us, and the further benefit we may expect to derive from these acquisitions, as well as the time already spent by the Directors during the past year, I suggest that this payment should commence on July 1 last, so as to cover the whole of our financial year. I think the resolution which I have read will appeal to you all; and I have much pleasure in moving it.

Mr. Kenneth R. Mackay said he was delighted to second the proposition. He was sure the Directors had done a tremendous amount of extra work during the last few months; and the proprietors ought to acknowledge it.

The resolution was carried unanimously.

The Chairman, on behalf of himself and his colleagues, returned thanks. He said it was quite true that this acquisition of other undertakings had meant a lot of additional work; and the extra remuneration would be gratefully accepted by the Board.

The Auditors.

The Chairman remarked that the next resolution referred to the appointment of Auditors. Before this was submitted, he would just like to point out that, as would have been seen from the report, Mr. William Cash, Sen., who has been their Auditor for many years, was retiring from his practice. He had informed the Board of this, and they had had great pleasure in electing his son, Mr. William Cash, Jun., to act in his stead. Everybody possessing any knowledge of gas undertakings realized that it was an asset to have the name of William Cash on a balance-sheet; and the Company were extremely fortunate in the fact that a son bearing the same name was so fully competent to follow his father. These remarks were merely to show the attitude of the Board, and were by no means intended to dictate to the proprietors.

Moved by Mr. M. H. Tetley, and seconded by Mr. W. J. Liberty, it was resolved that Messrs. E. Knowles Corrie and William Cash, Jun., M.A., F.C.A., be re-elected Auditors.

Mr. William Cash, Jun., returning thanks on behalf of his colleague and himself, said he knew his father would appreciate highly the kind remarks of the Chairman. He hoped that in course of years he himself might earn the same measure of respect that his father enjoyed.

Votes of Thanks.

Mr. C. A. Morgan said all would agree that they had a most excellent Board, who looked after, conserved, and furthered their interests in every possible direction. It therefore afforded him great pleasure to propose that the thanks of the meeting be given to the Chairman and Directors for their able management of the business of the Company.

Mr. Mackay seconded this; and it was cordially agreed to.

The Chairman said it was very gratifying to the Board to know that they had satisfied the proprietors. The Directors themselves were quite satisfied with the way in which the business was progressing. He would like to take the opportunity of proposing a hearty vote of thanks to the staff and workmen. The results that the Board had been able to place before the proprietors were, of course, only rendered possible by good service on the part of the staff and men generally. It had always been their desire to treat their employees properly; and he thought they had done so. The statistics regarding length of service made it quite clear that employment with the Company was appreciated. A contented man on a gas-works could do a great deal; and a discontented man could be a horrible nuisance. But they had contented men. It was seen throughout the industry—and certainly in the case of their own Company—that they were getting more and better gas and more residuals from the coal; and this was very largely accomplished through the greatest possible attention to detail. If the men were not willing to do their part in this direction, it made things extremely difficult; but their Company were happy in both staff and workmen. He must just say a word about their Secretary. It was astonishing, but none the less true, that by May next Mr. Brookes would have served the Company fifty years. Many of the proprietors knew him personally; and they were aware that no company had been better served.

Mr. Liberty seconded the motion, and said he would like to draw attention to the good service rendered by one of the Engineers of the Company—Mr. Harold E. Copp—who had accomplished splendid work in connection with the National Illumination Committee. From his own knowledge he could say that the value of the work Mr. Copp was doing in this connection could hardly be expressed in words.

The resolution having been carried,

Mr. Brookes returned thanks, and said he felt sure that all the officers, staffs, and men, in their respective departments, were doing their very best in the interests of the Company. All were proud to be in the service of a Company which enjoyed such a good name in the gas industry. On behalf of himself and everyone else in its service, he would like to take this opportunity of thanking the Chairman and Directors for the kind consideration always received at their hands.

CONTINENTAL UNION GAS COMPANY.

Ordinary General Meeting.

The Ordinary General Meeting of the Company was held on Tuesday, Sept. 27, 1927, at Winchester House, Old Broad Street, E.C.—Colonel H. LEROY-LEWIS, C.B., C.M.G., D.S.O., in the chair.

The SECRETARY (Mr. Arthur Nops) read the notice convening the meeting and the Auditors' report; and the report of the Directors and the statement of accounts were taken as read.

The CHAIRMAN: Ladies and Gentlemen,—I now beg leave to move that the report and accounts be received and adopted; and after the few remarks which I propose to make thereon, I shall be happy to reply to any questions which the stockholders may desire to ask, and to give a fuller explanation of any point that may not be quite clear.

ITEMS IN THE ACCOUNTS.

The first item in the accounts—copies of which are now in your hands—is, to the debit of profit and loss, a sum of £4504 representing office expenses. This is an increase of £156 over the corresponding figure of last year—an increase which is due to a large extent to a rise in the rent of our offices in Drapers' Gardens. The next item, Provision for Taxes, shows a reduction of £800. Last year I mentioned that the revision of the basis of assessment on which is calculated our liability for income-tax on receipts from the Union des Gaz, would in all probability render it unnecessary for us to make so large a provision this year as heretofore. This has proved to be the case. Furthermore, the provision which we already had in hand would have been more than ample to cover this year's requirements. It is only right and prudent, however, to charge the profits for each year with the amount of income-tax liability to which they are subject. What has been done, therefore, in our accounts this year is to make the necessary provision for this year's liability. The accumulated provision of previous years, which is now a surplus, has been transferred, to the amount of £7500, to the Exchange and Contingencies Reserve—to which account I shall make further reference when reviewing the balance-sheet. The next figure to the debit of profit and loss is a sum of £3000 allotted to the Exchange Reserve Account. This is the same amount as last year. For the benefit of new stockholders, I may be allowed to repeat that this Exchange Reserve Account was opened on our books some years ago in order gradually to build-up a reserve against the loss in sterling value which our French investments have suffered owing to the depreciation of the franc.

On the credit side we have dividends and interest received to the amount of £27,269—some £1100 less than the previous year. This decrease is more than accounted for by the loss in the conversion into sterling of our Union des Gaz dividends. During the year the amount of francs distributed on our Union des Gaz holding exceeded by Fr. 447,000 the amount distributed in 1925-6. Translated into pounds sterling, however, this increase of nearly half-a-million francs became a decrease of £1240. The average rate at which conversions were made this year was Fr. 151.15 to the pound, against Fr. 115.34 in the previous year. The amount of our refund of income-tax on management expenses shows a drop of £140. This is due to the extremely complicated method which is followed to arrive at the sum to be repaid, and includes a certain amount of adjustment in respect of previous years' repayments. Transfer fees also show a decrease—in a way a healthy sign, as it would seem to indicate that the proprietors are not anxious to get rid of their holdings. There remains to the credit of profit and loss account a balance of £16,797 7s. 6d. I shall indicate later on how it is proposed to deal with this.

THE BALANCE-SHEET.

Turning now to the balance-sheet, capital, of course, remains as before. Sundry creditors and credit balances, at £45,706, show an increase of £4800 over last year. This is explained to a great extent by the £3000 which has been allotted out of our profits to the Exchange Reserve Account; and the amount of Union des Gaz cash in our hands at June 30 was rather larger than before. Among these credit balances figures the Exchange and Contingencies Reserve. To this account there has been transferred during the year, as I have already said, £7500 from our Income-Tax Provision Account, in addition to the above-mentioned £3000—making a total now to the credit of Exchange and Contingencies Reserve of over £40,000. This account is not shown as a separate item on the balance-sheet, as it cannot be looked upon as an available reserve. It is earmarked to be used when the franc is stabilized and the Company's capital account is adjusted. There also figures among the sundry credit balances the Income-Tax Provision Account, which, after receiving the amount of £3500 allotted out of the year's profits to meet liabilities for the year, has been reduced by the transfer of the £7500 to Exchange and Contingencies Reserve.

On the other side of the balance-sheet, you will see that the figure of our gas investments remains practically unchanged. Our general investments total has been increased by some £8700. This is the result of the investment of the amount allotted to Exchange Reserve, and to the decrease which you will notice in the next item, Cash, Loans, &c. Last year we had an unusually large amount of money at our bankers and at short call. This figure has now been reduced to more normal proportions by an increase in permanent investments.

INVESTMENTS.

The amount for which our investments—apart from the Union des Gaz holding—figure on our books is considerably below their market value. Our interests are well spread—at home and abroad—in a variety of different activities; and a rough analysis of their nature can be shown in the following percentages:

	P.Ct.
British Government Securities	38
Gas Undertakings, other than Union des Gaz	21
Foreign and Colonial Rails	21
British Industrial and Financial Undertakings	10
Foreign Government Loans	8
Miscellaneous	2
	100

Sundry debtors show a small, unimportant increase.

PROFIT AND LOSS ACCOUNT.

Referring now to the profit and loss account, to the balance of £16,797 7s. 6d. has to be added the carry-forward of £2091 2s. 4d. from last year, making a total to be dealt with of £18,888 9s. 10d. An interim distribution of 3½ p.ct., less tax, on the preference stock was made in April last, absorbing £5600, and leaving a total now available of £13,288 9s. 10d. The Directors propose paying a further 3½ p.ct., less tax, on the preference stock (making 7 p.ct. for the year), and also recommend the payment of 1 p.ct., less tax at 4s., on the ordinary stock for the year. These two payments require £12,000, leaving £1288 9s. 10d. to be carried forward. Thus, in spite of a rather less prosperous year, we have been enabled to maintain the rate of dividend of last year.

COURSE OF THE FRANC.

The text for my annual speech seems to be inevitably the French Exchange. I gave you figures last year which showed that the amount lost on exchange during the previous five years was more than sufficient in itself to pay a dividend of 6 p.ct. on the ordinary stock. The situation can be said to have improved considerably during the last few months—not, it is true, to the extent of greatly enhancing the sterling value of French remittances. But the fact that since January last the rate has been practically stationary has to some degree relieved our minds from the condition of uncertainty into which the violent fluctuations of the preceding period had plunged us. A steady figure even of 124 francs to the pound is preferable to violent fluctuations between 80 and 240. The franc is, of course, not yet officially stabilized. Artificial means have been employed to maintain it so long at its present figure. It is extremely probable that it would have been better for us if such steps had not been taken; but the French Authorities have such a number of conflicting interests to study that it was essential that the figure decided upon for this temporary artificial stabilization should strike a mean which would do as little damage as possible to all of those various conflicting interests.

PROGRESS OF THE UNION DES GAZ.

When the official stabilization will take place—and at what figure—is still a subject of conjecture. Until this is done, it is not possible for us to take any steps to regularize our capital position. Meanwhile, we are continuing gradually to accumulate, in our Exchange and Contingencies Reserve, a fund which will contribute towards any sacrifice that may have to be made; and the Union des Gaz, in which our francs are invested, continues to make improved progress, and to consolidate its financial position. The market value, in francs, of our holding in that Company on June 30 last, exceeded by 50 p.ct. the market value on June 30, 1926; so that we have the consolation of knowing that, while we are patiently awaiting the stabilization of the franc, our francs themselves are improving in value.

I now beg to move that the report and accounts be received and adopted.

Sir HENRY BIRCHENOUGH, Bart., K.C.M.G., seconded the motion, which was unanimously adopted without discussion.

RE-ELECTIONS AND THANKS.

The CHAIRMAN next proposed the re-election as Directors of the Right Hon. Lord Wargrave, P.C., and Mr. S. H. LeRoy-Lewis. He asked the indulgence of the proprietors on behalf of three members of the Board who were unable to be present at the meeting. Sir George Touche, Bart. (the Deputy-Chairman), was detained by engagements in Scotland, Lord Wargrave was taking a well-earned rest in the Mediterranean, and his son, Mr. LeRoy-Lewis, was in a nursing home, having had to undergo surgical treatment.

Sir JAMES F. REMNANT, Bart., M.P., seconding the re-election of the retiring Directors, said he was sure it would be the wish of all present to convey through the Chairman to his son that he might have a speedy recovery and an early return to business.

The motion was unanimously adopted; and thereafter the Auditors (Messrs. C. P. Crookenden, F.C.A., and G. A. Cave-Orme) were re-appointed, on the proposition of Mr. R. J. F. REMNANT, seconded by Mr. A. G. MORRISH.

The CHAIRMAN said he had only one other duty to perform, and it was always a pleasing one—namely, to propose that the best thanks of the meeting be accorded to the staff for their services during the year. The staff was a very small but a very loyal one. The Company were extremely well served in London; and if any shareholder desired to have light thrown on the not very difficult operations of the Company, he had only to go to the offices, where he would be most courteously met by Mr. Nops or Mr. Swanson.

The vote was seconded by Sir HENRY BIRCHENOUGH, heartily carried, and acknowledged by Mr. NOPS on behalf of the staff.

NEW YORKSHIRE WELSBACH DEPÔT.

"Phœnix-Like and Better."

Less than one year after their headquarters Yorkshire depôt at Leeds was gutted by one of the most disastrous fires in recent years in that city, the Welsbach Light Company, Ltd., have completed a reconstructed and vastly improved property, and opened it for business.

The new depôt, with a bold and conspicuous frontage at 46, Park Place, Leeds, and with loading and unloading docks into York Place at the rear, was formally opened on Sept. 26, in the presence of a large assembly, by Mr. J. R. Yates, the Chairman of the Company. Mr. Yates was supported by Mr. H. Talbot (General Manager), Mr. A. R. Barford (Sales Manager), Mr. F. B. Carver (Local Resident Manager), and Mr. Reginald H. Palmer (Palmer's Publicity Service). Acceptances of the Company's invitation included Councillor E. Clarke (Chairman of the Leeds Corporation Gas Committee), Alderman George Ratcliffe, J.P. (Deputy Chairman), Mr. C. S. Shapley (Leeds City Gas Engineer and General Manager), Mr. Wm. Watson (Architect), and the representative of Messrs. Lazenby Bros., of Leeds (the Contractors).

The Welsbach Company have had a Yorkshire depôt at Leeds almost from the start of manufacture of Welsbach mantles, burners, and fittings in England, soon after the invention in 1887 by Dr. Auer von Welsbach; but it was only three years ago that the depôt at 46, Park Place, was established on a larger scale than had been possible on any previous site. Two years after its establishment, the depôt was gutted by fire; little being left beyond the substantial stone frontage in Park Place. Faced with the necessity of rebuilding, the Company took the opportunity of making further extensive improvements in the premises. The Yorkshire woollen and worsted area, of course, has always been a stronghold of gas lighting.

The rebuilt premises comprise six floors—a basement and five storeys—devoted to use as follows: Basement, goods inward (from the unloading dock abutting on York Place at the rear). Ground floor, offices, sale room, and despatch room (linked-up to the loading dock in York Place). First floor, extremely attractive showrooms for all lines. Second floor, stockroom for mantles, burners, and fittings. Third floor, stockroom for globes. Fourth floor, bowls for gas and electric use, and oil lighting goods. The loading and unloading docks in the rear are covered.

The premises are in the commercial centre of the city of Leeds, and within a few steps of the three main railway stations. Entering the building from Park Place, one passes the office accommodation on either side, and reaches the trade counter and a large and well-appointed room equipped with every possible device for inter-communication and for rapid handling of goods, to give the promptest possible attention to trade customers. On the left of the trade counter, or sale room, is the despatch department, communicating by electric lift with every floor in the building, and with the loading dock outside. There is also a hand-lift of small size for the movement of small goods up and down the building.

An ornamental staircase, near the entrance of the sale room, leads to the upper storeys. The showroom, on the first floor, is tastefully panelled and decorated so as to exhibit the firm's wares to the best advantage. Only wholesale trade is done; and clients of the Company are given the fullest opportunity to inspect at their leisure, and under skilled guidance, a large range of goods. In the stockrooms on the three floors above, the visitor is particularly struck by the orderly and systematic way in which everything is arranged and catalogued for the most expeditious storage and, at the same time, for the quickest means of selection of any desired article. The scheme is designed to cut-out all needless searching and handling; and there is complete absence of the untidiness and litter commonly associated with warehouse premises. Mr. Carver has conceived an excellent idea of numbering both the stock bins (which are of varying sizes to meet the needs of holding large or small quantities of goods in greater or lesser general demand) and the articles individually. The numbering is consecutive throughout each showroom; and the catalogue numbering corresponds strictly with that of bins and articles. An open catalogue is attached to a small desk in the centre of each stockroom, so that it is easy to find any desired article within a few moments.

At each end of every stockroom is a bench running the full width of the room. All goods taken from stock are examined or handled

Welsbach House, Leeds.

on these benches—gas goods at one end and electrical at the other. The stockroom system is repeated on all the three stock floors.

Opening Ceremony.

The formal opening ceremony—very brief, so that the visitors could have longer time for inspection of the depôt and its contents—took place in the showroom, where Mr. Yates, in a short and felicitous speech, welcomed the visitors and declared the premises open

VIEWS IN THE NEW SHOWROOMS.

for trading. He expressed the hope that, as one of the oldest of the Company's branches, and now in another sense the newest branch, the Leeds depôt and its staff would give steadily increasing service to an ever-widening circle of satisfied customers, to the advantage of all concerned. He trusted that the disastrous effects of last year's industrial upheaval and the general depression of trade, still being felt in West Yorkshire, would rapidly disappear. Mr. Yates voiced his thanks to the Architect and the Contractors for the speedy manner in which they had completed the rebuilt branch; and he warmly complimented Mr. Carver and his local staff upon the excellent manner in which they had carried on, under great difficulties, in small and temporary premises since the fire. "Welsbach," as everybody knew, were the pioneers in the gas mantle industry. The Company were making gas mantles for British and export trade and for the lighthouses of Trinity House; while they had also been asked at times to make them for the lighthouses of the United States. Great as were the traditions of the undertaking and its products, they had no intention of merely resting on their laurels; and their policy was to keep fully abreast of science and industrial development and improvement.

Mr. Carver thanked Mr. Yates for his kindly tribute to their efforts under difficulties; and Mr. George Whittington moved hearty thanks to Mr. Yates and to the Company for the welcome, and for the opportunity to inspect the new place which had arisen, Phœnix-like, and better than ever, from the ashes of the old Leeds depôt. It was a place and a Company that deserved every wish for complete success. Mr. Shapley, seconding the thanks, said the gas industry looked upon Welsbach very much as its own; but it had no feelings of reproach because the Company had also ventured into electrical lines. There was ample room for both gas and electricity; but gas gave a service, in lighting as in other matters, which was such that it need feel no fears of electrical competition.

The showrooms and stockrooms were then thrown open for general inspection by the public for the remainder of the week.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

Half-Yearly Meeting.

The Half-Yearly Meeting of the Alliance and Dublin Consumers' Gas Company was held in Dublin on Sept. 28—Mr. FRANCIS J. DICKINS, Chairman, presiding.

The CHAIRMAN, in moving the adoption of the report (already published in the "JOURNAL"— Sept. 21, p. 704), said it was again his privilege to submit figures of a satisfactory nature which clearly indicated substantial expansion of the Company's business. For instance, the sales of gas showed an increase for the half-year of no less than 134 million c.ft., equivalent to 19·1 p.ct. These results were the more gratifying because the materially increased sales of last half-year, which were regarded as due to some extent to the shortage of fuel in consequence of the coal strike, had actually been maintained during a period when coal was both cheap and plentiful. If they took the complete year ended in June last, the increased business amounted to nearly 300 million c.ft. The annual sales had now passed the 2000 million mark, showing that in Dublin approximately 50 p.ct. more gas was used now than five years ago. Another encouraging feature of the Company's business was that the demand for further gas supplies and additional gas apparatus continued to increase. The popularity of gas in pennyworths was emphasized by the increased demand for prepayment cookers, which were sent out and fitted at the rate of over 100 a week. Moreover, with the recent introduction of inexpensive and highly efficient gas fires, which were being offered on special terms, heating by gas, as well as cooking, was steadily growing with the working classes. In all the housing sites, gas was definitely established as the cooking agent, notwithstanding the keenest competition from the most modern electrical apparatus. At Fairbrothers Field a number of all-gas houses had been fitted. At Linenhall it was originally decided that the new housing site should be exclusively electric; the houses being cabled and wired for cooking, heating, and lighting by electricity only. When the tenants took up occupation, however, there was an immediate demand for a gas supply; and it was then necessary to lay mains and fix a service to each house. The majority were now using gas for cooking, and a number for heating and lighting.

During the half-year they had secured 3756 new consumers. There were fixed, during the six months, 3194 new cooking and 804 further heating stoves. These figures would give them some idea of the actual business done.

It was gratifying to point out that, during the past six months, the whole of their make of coal tar had been disposed of for use on the roads in the Free State. It had been decided to reduce the price again by 1d. per therm, to take effect in the case of the ordinary quarterly consumers as from the date of the meter readings for the December quarter 1927, and, in the case of other ordinary consumers and prepayment consumers, as from the date of the last meter reading prior to Jan. 1, 1928.

To summarize the financial position, their income for the half-year was larger by £43,556, while their expenditure had increased to the extent of £35,450, so that they were thus enabled to carry into the net revenue account a profit larger by £8106. The balance of net revenue available after meeting debenture and bank interest was sufficient to meet the dividend recommended of 7 p.ct. (the maximum permissible under the sliding-scale provisions), leaving the substantial balance of £26,069 to be carried to next account.

The motion for the adoption of the report and statement of accounts was seconded by Mr. J. V. MURPHY, and passed.

On the motion of the CHAIRMAN, seconded by the Right Hon. JAMES MACMAHON, a dividend was declared on the consolidated ordinary stock of the Company at the rate of 7 p.ct. per annum.

GAS REGULATION ACT APPLICATIONS.

SPECIAL ORDERS.

Barnstaple Gas Company.

To authorize the Company to use scheduled lands for gas purposes and to purchase additional lands.

Ilkley Urban District Council.

To extend the limits of supply to include the township or parish of Addingham; to permit of the purchase (subject to the approval of the Board of Trade) of the mains, plant, and works in the township of the Addingham Gas Light Company, Ltd.; to authorize the Council to borrow further money; and to confer other powers upon them.

TRADE NOTES.

"T.I.C." Tar Plant for Dunedin.

The Dunedin (New Zealand) City Council have ordered from the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., a "T.I.C." tar treatment plant having a capacity of 10 tons of crude tar per 24 hours.

Cast-Iron Bungalows—"Thorncliffe" Type.

Messrs. Newton, Chambers, & Co., Ltd., Thorncliffe Ironworks and Collieries, near Sheffield, have published a booklet describing their new design of cast-iron dwelling, which is one of the earliest successful efforts to provide houses at an economic rate (£285). The matter is of public interest.

Drakes Vertical Retorts for Halifax.

The Harrogate Gas Company have placed an order with Messrs. Drakes Limited, of Halifax, for a "Drakes" vertical retort installation. The first portion has a guaranteed throughput of 72 tons of coal per diem, but facilities are incorporated for extension, so that the completed plant will deal with 108 tons per day. This installation has been specially designed for erection in an existing house, but the principle and the capacity of the retorts are exactly the same as those embodied in the vertical installation upon which the firm are engaged for the Lostock Hall Works of the Preston Gas Company.

New Gasholder and Purifiers for Wolstanton.

At a recent meeting of the Wolstanton Urban Council, the Gas Committee recommended that a new gasholder, with a capacity of 500,000 c.ft., should be erected, and that the tender of Messrs. Newton Chambers & Co., Ltd., should be accepted. It was also recommended that the tender of Messrs. R. & J. Dempster, Ltd., for the extension of purifiers be accepted. The Committee's report stated that the time had now arrived when it was necessary to erect a new retort-house, and to carry out other extension work, at an estimated cost of £16,960; and it was therefore recommended that the Clerk be instructed to make application for sanction to borrow £35,000.

Otto Coke Ovens at Derwenthaugh.

The Silica Coke Oven & Machinery, Ltd., Aldwych House, W.C. 2, who are the English branch of the Otto Company, of Bochum, Germany—the Company which built so many of the existing coke oven plants in England—announce that the Consett Iron Company have placed an order for the installation of a battery of 56 new Otto coke ovens, with complete bye-product plant, at Derwenthaugh, Newcastle-on-Tyne. The plant is designed for the carbonization of 1500 to 1600 tons of coal per day, and the coking period will be 16 hours, with an oven charge of 18 tons. This will be the largest coking plant in Great Britain, and the capacity creates a record for the size of battery. The Newcastle and Gateshead Gas Company have contracted to take the surplus gas from this installation.

Lower Gas Charge at Spenborough.—The Spenborough Urban District Council have approved a reduction of the price of gas, to date from Oct. 1, to 4s. 1½d. per 1000 c.ft. This is lower than the pre-coal dispute price, which was 4s. 6d.

Price Reduction at Birstall.—The Birstall District Council have approved a reduction in the price of gas to the pre-coal dispute figure. This means a reduction (in two stages) of 10d. per 1000 c.ft. since the advances necessitated by the coal strike. At a recent meeting, Mr. L. Porritt, Chairman of the Gas Committee, submitted the minutes of the Committee, which contained the recommendation to reduce the price of gas to the figures obtaining before the coal dispute. The total loss on Dec. 31, 1926, was £2412, which was reduced to £1340 by March 31 last by means of an advance in prices. It was estimated that the deficit on Sept. 30 would be £730. Further, it was estimated that on the reduced prices proposed the loss would be reduced to £227 by the end of next March. The recommendation was adopted.

Retirement of Birmingham Gas Department Employees.—A number of presentations of illuminated addresses to employees of the Birmingham Gas Department on their retirement from the service of the Corporation were made on Sept. 26 by the Lord Mayor (Alderman A. H. James) at a meeting of the Gas Committee, under the chairmanship of Alderman J. H. Lloyd. The recipients of the presentations were: Mr. G. F. Whitehouse, cashier to the Department, 46 years' service; Mr. J. T. Hardwick, transport officer, 27 years' service; Mr. J. C. Clarke (Saltley Works), 44 years' service; Mr. G. Tavener (Saltley Works), 43 years' service; Mr. Charles Faulks (Saltley Works), 40 years' service; Mr. G. Green (Fittings Department), 36 years' service; Mr. S. Hale (Swan Village Gas-Works), 35 years' service; and Mr. E. Edwards (Saltley Works), 33 years' service.

Importance of Advertising.

Addressing the Advertising Association at the Birmingham Business Club last Tuesday week, the Right Hon. C. A. McCurdy said "advertising is the handmaid of commerce." He added that undoubtedly advertising was going to play a still more important part in the development of British trade and the British Empire; but, if the science of publicity lagged behind production and distribution, trade expansion must suffer. Combined or general advertising by a trade or industry had proved highly successful. It was essential that British manufacturers should make known their goods.

Gas at a Leeds Exhibition.—The Leeds Corporation Gas Department had two attractive stands, featuring gas appliances for the ideal home and making special points of the labour-saving and atmosphere-benefiting effects of the use of gas, at a Better Homes and Housing Exhibition held at Leeds last week.

Gas Price Lowered at Dorchester.—The Directors of the Dorchester Gas and Coke Company, Ltd., announce a reduction in the price of gas of 4d. per 1000 c.ft.—from 4s. 8d. to 4s. 4d. (12·44d. to 11·55d. per therm). The new price will take effect as and from the readings of the meters at the end of the current quarter.

Results at Elsecar.—At the annual meeting of the Elsecar Gas Company, the Chairman, Mr. Norman E. Holden, said that, despite the difficulties of the coal stoppage, the results of the year's working were very creditable, and they were able once more to pay the maximum dividend. During the year, 50,516,200 c.ft. of gas had been manufactured.

Further Price Reduction by the Gas Light and Coke Company.—The Company reduced the price of gas in their area by 1½d. per therm for the June quarter, and by ½d. per therm for the September quarter. They have now further reduced it by ½d. per therm for the December quarter, which makes the price cheaper than before the coal stoppage last year.

Reduction in Price at Clitheroe.—On Sept. 20 the Clitheroe Town Council decided to reduce the price of gas by 8d. per 1000 c.ft. The Gas Committee recommended a reduction of 5d., but the Chairman (Alderman Whiteside) agreed to the larger figure, providing the Council would stabilize the price until the reorganization of the undertaking was completed.

Revised Charges at Coventry.—Councillor Holt, Chairman of the Gas Committee of the Coventry Corporation, at a meeting of the Council on Sept. 27, urged the adoption of a further reduction in gas charges to users of more than 6 million c.ft. per month. The revised charges were: From 6 million to 9 million c.ft., 2s. 6d. per 1000; above 9 million c.ft., 2s. 5d. These prices were sanctioned.

Tamworth Gas Company.—At the general meeting of the Company, Dr. A. E. Richardson stated that the profit for the year ended June 30 was £1518. The Directors recommended the payment of a dividend of 10 p.ct. per annum on the old shares, and 7 p.ct. on the new shares, less income-tax, for the half-year ended June 30. They had every reason for hoping that, subject to ordinary trading conditions, the dividend would be maintained. The sales of gas and coke constituted a record.

Successful Working at Lewes.—Submitting the report and accounts of the Lewes Gas Company for the half-year ended June 30, Mr. W. E. Nicholson, the Chairman, stated that the profit was £2568; the balance of net revenue being £2741. It was recommended that dividends for the past half-year be declared at the rate of 5 p.ct. on the original capital stock, and 3½ p.ct. on the additional capital stock. Mr. A. E. Mason remarked on the extraordinary increase in the sale of coke.

Issue of Stock at Bognor.—The Directors of the Bognor Gas and Electricity Company have instructed Messrs. A. & W. Richards to offer for sale by tender, £15,000 additional ordinary consolidated stock "A." The stock ranks for a standard dividend of 5 p.ct., subject to the sliding-scale, equally with the existing similar stock, now receiving dividend at the rate of 7½ p.ct. per annum. The minimum price of issue is £105 per £100. Tenders must reach Messrs. Richards, 37, Walbrook, E.C. 4, not later than eleven o'clock on Thursday, Oct. 13.

Good Results at Buxton.—In his report on the working of the Buxton Gas Department for the year ended March 31, Mr. F. G. Shaw, the Engineer and Manager, states that the Service Department has greatly assisted in maintaining progress under adverse conditions, and in quickly restoring normal working. Throughout the period a full supply of gas was maintained. The make of gas for the year shows an increase of 11,583,700 c.ft. With regard to the sales of gas appliances, the past year constituted a record. The net profit for the year was £2959.

Loss at Teignmouth.—The accounts of the Teignmouth Council's gas undertaking for the past year show a loss of £2495. The total income of the undertaking was £24,914, and the expenditure reached £27,409. This loss may be recovered during the present year, provided the present price of gas is maintained and no further rise in coal prices takes place. The loss occurred through the Council being compelled to purchase foreign coal to carry on the supply of gas during the seven months' coal dispute. The average cost of all the coal used throughout the year was an advance on the previous year's average of 10s. per ton. The expenditure on coal was £2600 extra. The additional cost due to the strike can be taken at £3000. To meet this, the price of gas was increased from Oct. 1, 1926, by 1d. per therm, and the extra revenue thus obtained during the latter half of the year for gas sold was £680. The total make of gas for the year was 79,361,000 c.ft. The credit balance at the end of the year had been reduced to the low figure of £175.

Reduction at Wolstanton.—The price of gas at Wolstanton has been reduced by 4d. per 1000 c.ft.

Gas Cheaper at Matlock Bath.—It has been decided to reduce the price of gas in the Matlock Bath area by 3d. per 1000 c.ft.

Leicester Gas Prices.—During Michaelmas quarter, 1926, 15 p.ct. was added to the ordinary price of gas. This, as is announced by the City of Leicester Gas Department, will be discontinued from the readings for the Michaelmas quarter this year. Special arrangements have been made in connection with prepayment meter supplies.

Gas Exhibition at Elland.—A highly successful exhibition was held last week by the Elland-cum-Greetland Gas Company. Lectures and practical cookery demonstrations were given daily to large and appreciative audiences by Miss H. Crawford-Fox, L.C.A. At the close of the lectures, the special local prizes awarded in connection with the Twelfth Annual Fairy Gas Competition were distributed. During the period of the exhibition, the gas-works have been open for inspection, and no less than eight organized parties of school children have visited the works.

Cheaper Gas at St. Columb.—Mr. W. H. Polkinghorne was re-elected Chairman of Directors of the St. Columb Gas Company last week, and in returning thanks congratulated the shareholders on the continued success and prosperity of the Company. He stated that there was a further increase of over 300,000 c.ft. of gas used during the year ended June 30. A dividend of 6 p.ct. per annum, less income-tax, was declared, and it was decided to reduce the price of gas, as from Oct. 1, by 6d. per 1000 c.ft. to consumers by ordinary meters and cooking stoves, and give a rebate of 5 p.ct. on amounts collected from slot meters.

The price of gas at Elgin has been lowered, by 5d., to 4s. 7d. per 1000 c.ft.

An exhibit of the Thornton Gas Department won first prize in a Trades Procession on Sept. 24.

The Sanquhar Town Council have decided to reduce the price of gas from 9s. 2d. to 8s. 4d. per 1900 c.ft.

The Parish Council of Wotton have accepted the local Gas Company's tender for the lighting of Wotton from Oct. 1 to March 31.

At a meeting of the Poulton-le-Fylde District Council on Sept. 22, it was stated that the adverse balance on the year's working of the Gas Department was only £67.

The Oswaldtwistle District Council have decided to erect a new holder at the gas-works; and application is being made to the Ministry of Health for borrowing powers.

The Liskeard Rural District Council have granted an application by the Surveyor for the Northern Division for the expenditure of £500 on tar spraying the roads.

On Sept. 19, Horace Hadley, of Maltby, was fined £1 10s. and 17s. 3d. costs for stealing from a gas meter 9s. 4d., the property of the Maltby and Bramley Gas Company.

At a meeting of the Oswaldtwistle District Council on Sept. 22, the Gas Committee recommended plans for new gas offices. The matter was referred for discussion in Committee.

The Alfreton Urban Council have decided as an experiment to keep twelve lamps alight all night at dangerous corners in their area. The experiment will last for about three months, and the cost will be about £50.

At a recent meeting of the Whitwell Parish Council, a protest was raised against the tender of the Whitwell Gas Company for street lighting at Whitwell for £2 11s. per lamp. The question of accepting the tender was deferred.

The Skipton Urban District Council, last week, coming to the ominous decision to increase the local rates by 3s. 6d. in the pound, had to do so by candle light, owing to failure of the town electricity supply, which is obtained in bulk for local distribution.

At a recent meeting of the Brighton Town Council, it was stated that since 1914 there had been an increase of 400 p.ct. in the number of gas meters tested. Gas tests at Spring Gardens now numbered 450 a year; and in connection with the testing of pressure, 250 visits a year were paid to the Preston Circus Police Station.

The value of gas has been brought home to the inhabitants of Letterkenny, one of the chief towns of Co. Donegal, where there has been no supply for some time, owing to alterations which are being effected at the gas-works. The matter has been the subject of frequent discussion at the Urban Council meetings. The Gas Manager states that gas should be available by Oct. 8.

Recent failures of electricity supplied in bulk by the Yorkshire Electric Power Company to local authorities at Shipley, Otley, and various other Wharfedale districts caused a good deal of disturbance in those places. The failure of electric light was for little short of two hours on a busy shopping night. At Shipley the tramways were stopped for an hour, it being found impossible to get connection with the reserve supply from another of the Company's stations. The trams were eventually re-started, on weak power, by linking-up to Bradford Corporation current; but it was not until much later that lighting was restored by the Electric Company's engineers finding the defects in the high-pressure mains. There has been a chorus of protest by shopkeepers, who say the light failure probably cost them hundreds of pounds in loss of business; and at the Shipley Urban District Council meeting subsequently, the wisdom of the Council's policy in transferring from local generation to bulk supply was questioned.

STOCK MARKET REPORT.

THE Stock markets continued to present a cheerful appearance during the whole of last week; but the settlement had a restrictive influence in some directions. There is little doubt that the Government conversion offer, which expired on Friday last, has been successful; and it is expected that the success will have a beneficial effect all round. Industrial issues continued to attract most attention, but the prices of the popular shares are, it is thought, unduly high. It is remarkable that the yield, on the last dividend, is in some cases less than the yield on gilt-edged securities. Among the Government stocks, the 3½ p.ct. Conversion Loan rose to 74⅝, and the 5 p.ct. War Loan was higher at 102⅜. The Foreign Market was also more active. Substantial advances accrued in Chinese Bonds, and the improved Nitrate outlook caused more interest to be taken in Chilean loans. With regard to the low yield on certain Industrial shares mentioned above, two extreme cases are Dunlops and "Daily Mirror" shares, on which at present prices the return is only £3 16s. 2d. p.ct. (gross) per annum. Courtaulds also at £7 4s. show a yield of £3 18s. 1d. p.ct. (gross), and despite the prosperity of the firm—the new acetate process is said to be very successful—caution is advisable.

The Gas Market displayed a particularly firm tone last week. It will be seen from the Table that, apart from *ex* div. reductions, all changes in prices of ordinary stocks and shares were on the upgrade. North Middlesex consolidated headed the list with a rise of 3 points to 93-96. Southampton 5 p.ct. rose 2 points to 75-78; Croydon sliding-scale and Gas Light both rose 1 point; Commercial gained ½ to 87-89; and Primitiva £1 shares rose 3d. to 16s. 6d.-17s. 6d.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 85½, Bournemouth "B" 12½, 4 p.ct. debenture 77, British 110½, Commercial 87¾, Continental Union 7 p.ct. preference 85, Croydon sliding-scale 99, 99½, maximum dividend 79, 79½, European 6⅞, Gas Light and Coke 88, 88¼, 88¾, 3½ p.ct. maximum 60, 60⅜, 6 p.ct. debenture 104, 5 p.ct. debenture 99⅝, 100, Imperial Continental 141, Primitiva 16s. 3d., 16s. 6d., 16s. 9d., South Metropolitan 102½, 103, Wandsworth, Wimbledon 5 p.ct. 101½. Supplementary prices, Croydon 4 p.ct. debenture 75, 76, Romford 4¼ p.ct. debenture 65½, 66.

On Tuesday, Alliance and Dublin 85½, 86⅛, Bournemouth 4 p.ct. debenture 76¾, Colonial 26s. 1¼d., 8 p.ct. preference 23s. 7½d., Gas Light and Coke 88⅜, 88⅛, 88⅞, 89⅛, 3 p.ct. debenture 59½, Imperial Continental 141, 142, Primitiva 16s. 6d., South Metropolitan 102½. Supplementary prices, Croydon 4 p.ct. debenture 75½, Grays and Tilbury "B" 8⅝, 8¾.

On Wednesday, Alliance and Dublin 85½, Gas Light and Coke 88½, 88⅝, 88¾, 89, 89⅛, 89½, 3½ p.ct. 60, 61⅛, 5 p.ct. debenture 100, Imperial Continental 141, North Middlesex 6 p.ct. 92, Oriental 101, Primitiva 16s. 6d., 16s. 9d., South Metropolitan 102½, 102⅝, 103, Wandsworth, Wimbledon 5 p.ct. 102½, new ordinary 91, 91½.

On Thursday, Cape Town 8¼, Gas Light and Coke 88½, 88¾, 89½, 4 p.ct. preference 76½, 3 p.ct. debenture 59, Primitiva 17s., South Metropolitan 102½, 6 p.ct. preference 111½, 3 p.ct. debenture 59, Uxbridge, Maidenhead, 5 p.ct. preference 84½. Supplementary prices, Hampton Court 5 p.ct. 105½, Hartlepool 5 p.ct. 83¾.

On Friday, Commercial 87¼, Gas Light and Coke 88⅝, 89, 89¼, 89⅜, 4 p.ct. preference 75⅜, 3 p.ct. debenture 60, 5 p.ct. debenture 100, Imperial Continental 143, Montevideo 91½, 92½, Primitiva 16s. 9d., 17s., 17s. 1½d., 17s. 3d., South Metropolitan 102½, 6 p.ct. preference 112⅜, 3 p.ct. debenture 59, Southampton 4 p.ct. debenture 75⅜, 75¾, Wandsworth 3 p.ct. debenture 57½, 58. Supplementary prices, Ascot 4 p.ct. debenture 63½, 64, Bath 5 p.ct. debenture 94⅜, Hartlepool 5 p.ct. maximum 83½, Oxford 5 p.ct. debenture 92, 92½, Redhill "B" 80½, 81½.

In Lombard Street, with the close of the month and the quarter, the money turnover was very large, but the demands were met without any difficulty. The banks were free lenders at 3½ p.ct., balances being available at 3 p.ct. With the large distribution of dividends on Oct. 1 and the repayment of maturing Government debts, further funds will be available, but it is not anticipated that money will be cheaper. Treasury Bills were allotted at £4 7s. 8·09d. p.ct., or 2s. 8·14d. p.ct. more than the average for the previous week. The higher rate was probably due to the beginning of January maturity.

In the Foreign Exchange Market, a satisfactory feature was the strength of Sterling, which during the week was quoted above par, closing at 4.86$\frac{15}{32}$. Spanish currency was weaker at 27.97, but there was little variation in other exchanges. Dutch florins finished at 12.13$\frac{11}{16}$d, Belgas at 34.93½, and German marks at 20.42¼. French francs and Italian lire were unchanged.

Silver was a dull market. With America selling, the price declined to 25$\frac{11}{16}$d. per oz. Gold was quoted ½d. higher at 84s. 11d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. The Banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2¼ p.ct. at call and 2¾ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Sept. 30.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Sept. 8	5	5				
223,992	"	"	4	4	Aldershot 5 p.c. max. C.	68—73	..	..
1,551,868	"	Sept. 29	7	7	Do. 4 p.c. Pref.	67—70	..	..
274,000	"	July 14	4	4	Alliance & Dublin Ord.	88—86*	−1	85¼—86½
522,654	"	Aug. 25	—	7	Do. 4 p.c. Deb.	64—67	..	..
300,000	1	Apl. 28	1/7½	1/7½	Barnet Ord. 7 p.c.	101—104	..	..
170,000	10	Aug. 25	8½	8½	Bombay, Ltd.	1$\frac{1}{16}$—1$\frac{3}{16}$	..	..
300,050	10	"	7	7	Bournemouth 5 p.c.	12½—13½	..	..
275,000	10	"	6	6	Do. B 7 p.c.	12—12½	..	..
50,000	Stk.	June 29	3	3	Do. Pref. 6 p.c.	10⅜—11¼	..	12½
162,025	"	"	4	4	Do. 5 p.c. Deb.	55—58	..	..
257,900	"	Aug. 25	—	7½	Do. 4 p.c. Deb.	74—77	..	..
341,800	"	"	—	6/8/6⅔	Brighton & Hove 6 p.c. Con.	102—105	..	76¾—77
1,337,500	"	July 28	5	6	Do. 5 p.c. Con.	92—95	..	..
885,000	"	Sept 29	7	8	Bristol 5 p.c. max.	84¼—85¼a	..	..
100,000	"	June 29	7	7	British Ord.	107—110*	..	..
120,000	"	"	4	4	Do. 7 p.c. Pref.	112—117	−2	110½
200,000	"	"	—	33/2	Do. 4 p.c. Red. Deb.	73—78	..	..
100,000	10	May 26	6	8	Do. 5 p.c. Red. Deb.	94—96	..	..
100,000	10	Apl. 28	4½	4½	Cape Town, Ltd.	7¾—8¼	..	..
150,000	Stk.	June 29	4½	4½	Do. 4½ p.c. Pref.	6—7	..	8½
686,880	"	July 28	6	6	Do. 4½ p.c. Deb.	70—75	..	..
287,860	"	June 29	7¼	7¼	Cardiff Con. Ord.	100—103	..	..
157,150	"	Aug. 11	6½	6	Do. 7½ p.c. Red. Deb.	100—103	..	..
79,185	1	Apl. 28	1/-	1/-	Chester 5 p.c. Ord.	87—92b	..	..
24,495	1	"	1/4½	1/4½	Colombo Ltd. Ord.	29/—31/-	..	..
321,490	1	Apl." 7	1/9½	1/9½	Do. 7 p.c. Pref.	20/—22/-	..	..
173,900	1	"	1/7½	1/7½	Colonial Gas Assn. Ld. Ord.	25/—27/-	..	..
2,073,280	Stk.	July 14	—	5	Do. 8 p.c. Pref.	20/—29/-	..	26/1½
475,000	"	June 16	8	8	Commercial Ord.	87—89	..	28/7½
800,000	"	Sept. 29	‡1	‡1	Do	55—58	+½	87¼—87½
200,000	"	"	7	7	Continental Union, Ltd.	31—34*	−1	..
787,560	"	Aug. 11	6½	6½	Do. 7 p.c. Pref.	82—84*	−2	..
403,190	"	"	5	5	Croydon sliding scale	97—100	+1	85
492,270	"	Aug. 25	9	6	Do. max. div.	77—80	..	99—99½
55,000	"	June 29	4	4	Derby Con.	108—105e	..	79—79½
209,000	"	Aug. 25	5	5	Do. Deb.	73—75e	..	..
50,000	"	June 16	5	5	East Hull Ord. 5 p.c.	78—81	..	..
1,002,180	10	Sept. 29	‡3	‡4	Eastbourne 5 p.c. Deb.	90—95	..	..
18,747,460	Stk.	July 28	5	5	European, Ltd.	6½—6⅝*	..	..
3,600,000	"	"	3½	3½	Gas Light & Coke 4 p.c. Ord.	88—90	−½	6⅝
4,157,020	"	"	4	4	Do. 3½ p.c. max.	59—61	+1	88—89½
5,602,620	"	June 16	8	8	Do. 4 p.c. Con. Pref.	74½—76½	..	60—61½
181,315	"	"	6	6	Do. 3 p.c. Con. Deb.	58—60	..	76½—76½
1,542,770	"	"	6	6	Do. 5 p.c. Br'tf'd Rd. Db.	102—105	..	59—60
42,000	"	"	5	5	Do. 5 p.c. Red. Deb.	98½—100½	+1	104
89,500	"	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	99½—100
258,740	"	Aug. 25	6½	6½	Hastings & St L. 5 p.c. Conv	88—91	..	..
70,000	"	"	5½	5½	Do. 3½ p.c. Conv.	66—69	..	..
173,200	10	Apl. 28	†10	†10	Hongkong & China, Ltd.	12—13	..	..
1,976,000	Stk.	Aug. 25	5	5	Hornsey Con. 3½ p.c.	65—68	..	..
323,130	"	May 12	10	10	Imperial Continental Cap.	140—142	..	..
235,242	"	Aug. 11	3½	3½	Do. 3½ p.c. Red. Deb.	68—70	..	141—142
2,145,907	"	Aug. 11	6½	7	Lea Bridge 5 p.c. Ord.	94—97	..	..
600,000	"	Aug. 11	5½	5½	Liverpool 5 p.c. Ord.	84—85b*	..	..
165,786	"	Sept. 29	7	7	Do. 7 p.c. Red. Pref.	101—103b*	−2	..
63,480	"	Aug. 25	8	9	Maidstone 5 p.c. Cap.	107—112	..	..
75,000	"	June 16	8	8	Do. 3 p.c. Deb.	52—55	..	..
541,920	5	June 16	‡7	‡8	Malta & Mediterranean	5½—6½	..	..
2,061,315	Stk.	May 26	‡5	‡7	Montevideo, Ltd.	91—93	+½	..
360,929	"	July 28	5	5	Newcastle & Gateshead Con.	74½—75¼d	..	91½—92½
691,705	"	"	4	4	Do. 4 p.c. Pref.	69½—70¼d	..	..
131,785	"	June 29	8½	8½	Do. 3½ p.c. Deb.	66½—67¼d	..	..
300,000	"	Aug. 25	—	6/18/0	North Middlesex 6 p.c. Con.	93—96	+3	..
188,120	"	Apl. 28	9	7	Oriental, Ltd.	100—102	..	92
414,500	"	June 21	7½	7½	Plym'th & Ston'house 5 p.c.	102—107	..	101
286,782	"	Aug. 25	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	102—105	..	..
2,389,909	"	"	5	5	Do. 5 p.c. max.	76—79	..	..
282,200	1	—	—	—	Primitiva Ord.	16/6—17/6	+·/3	16/3—17/3
600,000	100	June 1	4	4	Do. 4 p.c. Red. Deb.	84—86	..	..
484,968	Stk.	July 28	4	4	Do. 4 p.c. Red. Deb. 1911	72—74	..	..
150,000	"	June 29	—	4	Do. 4 p.c. Cons. Deb.	72—74	..	..
195,000	10	Sept. 29	6	6	San Paulo 6 p.c. Pref.	7¾—8¼*	..	..
270,000	50	June 29	5	5	Do. 5 p.c. Red. Deb.	46—49	..	..
419,968	Stk.	Sept. 8	5½	5½	Sheffield A	99¼—100¼e*	..	..
1,047,000	"	"	5½	5½	Do. B	99¼—100¼e*	..	..
90,000	"	"	5½	5½	Do. C	99¼—100¼e*	..	..
6,609,895	10	May 26	4	6	South African	4—6	..	..
500,000	Stk.	Aug. 11	7	5	South Met. Ord.	102—104	..	102½—103
1,895,445	"	—	—	—	Do. 6 p.c. Irred. Pf.	110—113	..	111½—112⅜
784,000	"	July 14	3	3	Do. 3 p.c. Deb.	57—60	+1	59
91,500	"	Sept. 8	6½	6½	Do. 6½ p.c. Red. Db.	101—103	..	..
1,243,795	"	Aug. 11	8½	8½	South Shields Con.	101—103d	+1	..
368,837	"	July 28	6½	6½	South Suburban Ord. 5 p.c.	102—105	..	..
647,740	"	June 16	5	5	Do. 5 p.c. Deb.	93—96	..	..
121,275	"	Sept. 8	5	5	South'mpton Ord. 5 p.c. max.	75—78	..	..
360,000	"	June 29	4	4	Do. 4 p.c. Deb.	73—76	+2	..
200,000	"	Aug. 25	7	7	Swansea 7 p.c. Red. Pref.	100—103	+2	75⅜—75½
120,000	"	June 16	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
882,275	"	July 28	7½	7½	Tottenham District A 5 p.c.	105—108	..	..
160,000	"	"	6½	6½	Do. B 3½ p.c.	89—92	..	..
181,255	"	"	5½	5½	Do. 5½ p.c. Pref.	95—98	..	..
258,251	"	June 16	4	4	Do. 4 p.c. Deb.	72—75	..	..
	"	Mar. 10	5	5	Tynemouth Con. and New	80—82d	..	..
289,094	"	Aug. 25	6½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c.	85—90	..	..
88,880	"	"	5	5	Do. 5 p.c. pref.	88—88	..	84½
80,000	"	July 14	8½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	117—122	..	..
255,686	"	"	7	7	Do. B 3½ p.c.	100—105	..	..
452,585	"	"	5/19/0	5/19/0	Do. C and New	88—93	..	..
372,000	"	"	6⅝	6⅝	Do. Wimbledon 5 p.c.	98—103	..	91—91½
98,000	"	"	7½	7½	Do. Epsom 5 p.c.	100—105	..	101½—102½
200,000	"	"	5	5	Do. 5 p.c. Pref.	83—88	..	..
88,416	"	June 29	8	8	Do. 8 p.c. Deb.	55—58	..	57½—58
284,743	"	"	4	4	Do. 4 p.c. Deb.	73—76	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div. † Paid free of income-tax. ‡ For year.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

There is little change to report, and the market remains dull and depressed in all sections. Inquiries from abroad are scarce, and collieries, quite unable to see any means of reducing costs, can only quote current values for forward business. There seems to be no inclination on the part of buyers to contract ahead at these figures, and such business as is passing is only of the hand-to-mouth variety. Much of it is being put through at a loss, as it is less costly generally to incur a small loss than to lay the pits idle. Many collieries, however, are experiencing much idle time, as there is not enough trade to go all round at any price, and the difficulty of financing continuous and increasing losses is in many cases becoming acute.

Northumberland steams continue very weak, and best screened sorts are obtainable down to 13s. 3d. f.o.b. for prompt, which, with smalls at about 9s. 3d., is a hopeless proposition for producers. In Durhams, gas coals show no improvement, and, while Wear Specials and best qualities are fairly steady at about 15s. 6d. to 16s. f.o.b., seconds and other grades are selling at 13s. 3d. to 13s. 9d., with 14s. the nominal quotation for forward. Coking coals are nominally 13s. 9d. to 14s. 3d.; but these prices are again discountable for prompt, demand being very small. Best bunkers are 14s. to 15s. f.o.b., and seconds freely offered at 13s. 3d. to 13s. 6d.

The demand for gas coke is good, and supplies up to the end of the month are scarce. The current price for shipment is 20s. 6d. to 20s. 9d. f.o.b.

YORKSHIRE AND LANCASHIRE.

With all gas coal contracts fixed, this section of the trade in Yorkshire and Lancashire is increasing its tonnages according to requirements at the end of "Summer Time."

Domestic coal prices have been increased as from Oct. 1. The increase in the majority of cases is 2s. per ton, although in some instances, where the reductions during the summer were very considerable, the advances amount to as much as 3s. or 4s.

The industrial situation causes some anxiety, for, with the better working hours at pits, there will be an increased surplus of steam-raising fuel available. This, taking into account that the majority of the coal is now being sold well below the cost of production, will probably result in some of the collieries putting more fuel into stock.

The export market shows a minute improvement; but the orders are small, and do not affect the position in any way.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 16s. 6d. to 16s. 9d.; screened gas coal, 16s. 3d. to 16s. 6d.; washed trebles, 16s. 6d. to 16s. 9d.; washed doubles, 15s. 6d. to 16s.; washed singles, 15s. 3d. to 15s. 6d.; washed smalls, 11s. to 11s. 4½d.; rough slack, 9s. 6d. to 9s. 9d.; smithy peas, 17s. 3d. to 17s. 9d. per ton. West Yorkshire—Hartley's (f.o.b. Goole), 14s. 6d. to 15s. 6d.; screened gas coal, 14s. 6d. to 15s. 6d.; washed trebles, 15s. 3d. to 15s. 6d.; washed doubles, 15s. to 15s. 6d.; washed singles, 15s. to 15s. 6d.; washed smalls, 10s. 6d. to 11s.; unwashed trebles, 15s. to 15s. 6d.; unwashed doubles, 11s. 6d. to 12s.; rough slack, 9s. 3d. to 9s. 6d.; coking smalls, 9s. 6d. to 10s. per ton. Derbyshire and Nottinghamshire—Top hards, 17s. 6d. to 18s. 6d.; washed doubles, 16s. to 16s. 3d.; washed singles, 15s. 3d. to 15s. 6d.; washed smalls, 10s. 6d. to 11s.; rough slack, 9s. 3d. to 9s. 6d. per ton. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. 6d. to 15s. 3d.; gas coke, 21s. to 22s.; furnace coke, 18s. 6d. to 19s. per ton.

MIDLANDS.

The trade is entering upon a new phase. There has been a sharp tightening-up in the house coal department, owing partly to inclement weather and partly to expectation of a rise in prices. The distributive resources have therefore been temporarily overstrained; difficulty being experienced in getting all demands satisfied.

With "Summer Time" at an end, consumption has increased automatically. The demands of electricity undertakings, central heating, and other domestic services tend to check the accumulation of smalls and slacks.

There is no very clear warrant for deducing from seasonal developments the re-stabilization of the coal mining industry. Even in districts which have been relatively well employed the financial position is far from satisfactory. There is very little sign of real extension in the industrial demand. In the case of gas coal, some activity will be infused into the market by the bigger lighting load; but at present power and other industrial purposes are not making any appreciable impression.

October has not produced such extensive revision of prices as had been expected. There have been advances of 1s. to 1s. 6d. on particular grades of coal, and these will no doubt be passed on to the consumer. But there is no general advance in the Birmingham area. Notwithstanding the recent spurt, colliery managements are a little dubious. They know that householders' stocks are less bare than they have been usually at this season, and the announcement of winter advances depends upon the order book.

With regard to the talk about the various miners' organizations uniting to terminate wage agreements simultaneously, the Warwickshire Miners' Association declare they will loyally carry out their agreement with the owners during the period fixed.

COAL CONSUMPTION IN 1926.

Frequently authors of papers quote data regarding the distribution of coal consumption in this country. It will therefore be interesting to give from the recently issued report of the Chief Inspector of Mines the following table, which shows, in millions of tons, the coal consumed by various classes of consumers in Great Britain in the years 1913, 1925, and 1926:

1 = 1,000,000 *Tons*.

Consumers.	1913.	1925.	1926.	P.Ct. of Total Consumed in 1925.§
Gas-works	16·7	16·45	16·74	9·7
Electricity generating stations of authorized undertakings and of railway and tramway authorities	4·9	8·08	8·56*	4·8
Railway companies (locomotive use)	13·2	13·36	11·43	7·9
Vessels engaged in coastwise trade (bunkers)	1·9	1·16	0·74	0·7
Iron-works (pig-iron)	21·2	12·03	4·69	7·1
Steel and iron works (other than pig-iron)†	10·2	9·26	Approximately 86 to 91‡	5·4
Collieries (engine fuel)	18·0	15·42		9·1
Domestic coal, including miners' coal (approximate)	40·0	40·00		23·6
General manufactures and all other purposes	57·7	53·81		31·7
Total	183·8	169·57	128 to 133	100·0

* Approximate and provisional.
† These figures cover only the coal, or its equivalent in coke, used in the manufacture of products coming within the purview of the National Federation of Iron and Steel Manufacturers.
‡ Separate particulars not available. Included with "General manufactures and all other purposes."
§ The percentages for 1926 cannot be stated.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 3.

Pitch is rather quiet, and the price is about 90s. net per ton f.o.b. makers' works.

Creosote is firm at 8¾d. to 8⅞d. net per gallon in bulk.

Tar spirits are without material change. Pure benzole is 1s. 5d. to 1s. 6d. per gallon; pure toluole, 1s. 11d. to 2s. per gallon; 95/160 solvent naphtha, 1s. 2d. to 1s. 3d. per gallon; pyridine, 6s. to 6s. 6d. per gallon.

Phenol is 8d. per lb., in large drums and overcasks.

Tar Products in the Provinces.

Oct. 3.

The average prices of gas-works products during the week were: Gas-works tar, 61s. to 66s. Pitch—East Coast, 84s. to 85s. f.o.b. West Coast—Manchester, 79s. to 80s.; Liverpool, 82s. to 82s. 6d.; Clyde, 83s. to 84s. Benzole, 90 p.ct., North, 1s. 1d. to 1s. 2d.; crude, 65 p.ct. at 120° C., 10d. to 10½d., naked at makers' works; 50/90 p.ct. naked, North, 1s. 3d. to 1s. 4d. Toluole, naked, North, 1s. 4d. to 1s. 5d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 9½d. to 10d. Heavy naphtha, North, 10d. to 1s. Creosote, in bulk, North, liquid, 7⅝d. to 7⅞d.; salty, 7⅜d. to 7½d.; Scotland, 7½d. to 7⅝d. Heavy oils, in bulk, North, 8⅜d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 4d. to 2s. 5d. prompt. Naphthalene, £11 to £14; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality unsaleable.

Reduction at Helston.—The Helston Town Council have reduced the price of gas by 6d. per 1000 c.ft. for the current quarter.

"Competition Points for Gas Salesmen."

By A. F. Bezant and N. S. Smith, B.Sc.

Price 7/6, post free.

LONDON: WALTER KING, LTD., 11, BOLT COURT, FLEET STREET, E.C. 4.

CONTENTS.

EDITORIAL NOTES.

The Southampton Conference 107
Work of the Industry on the Sales Side . . 108
The Problem of the Small Gas Undertaking . 109
A Coke-Oven Gas Agreement 110
Gas Section of the Birmingham Fair . . . 110
"A Great Industry"—"The Gas Salesman"—The Gas Grid in Germany . . . 110
"Coalite"—Ice Discs for Gas Meters—L. and S.E. Electricity Scheme—Doubts . . . 111

Personal—Sir Russell Bencraft 111
Obituary 111
Electricity Supply Memoranda 112
The Plymouth Tar Distilleries—Visit of Municipal and County Engineers . . . 113
The Fair at Birmingham—Gas Industries Section 114
Forthcoming Engagements 114
"B.C.G.A." Conference at Southampton—
Dinner in the "Majestic" 115
Business Meeting 118
Lord Burnham on Publicity 120
Salesmanship in the Showrooms. By Miss Gladys Burlton, B.A. (Lond.) 122

"B.C.G.A." Conference (*continued*)—
Reception and Lecture 124
New Health. By Sir Bruce Bruce-Porter, K.B.E., C.M.G., M.D. 125
Conference Luncheon 126
Presidential Address of Sir Russell Bencraft, M.R.C.S.E., J.P. 127
The Commercial Prospects and Future Co-Operation of the Gas Industry. By Ralph Halkett 130

MISCELLANEOUS NEWS.

Stockport Gas Department—Engineer's Report 135
Slippery Roads—Highway Engineer's Duty . 135
Launch of the s.s. "Lady Olga"—Gas Light and Coke Company's New Collier . . . 135
Production of Public Utility Services—Board of Trade Preliminary Report 136
Trade Notes 136
Coal Trade Reports—
Midlands 137
North-East Coast 137
Yorkshire and Lancashire 137
Current Sales of Gas Products 138
Stock Market Report 139

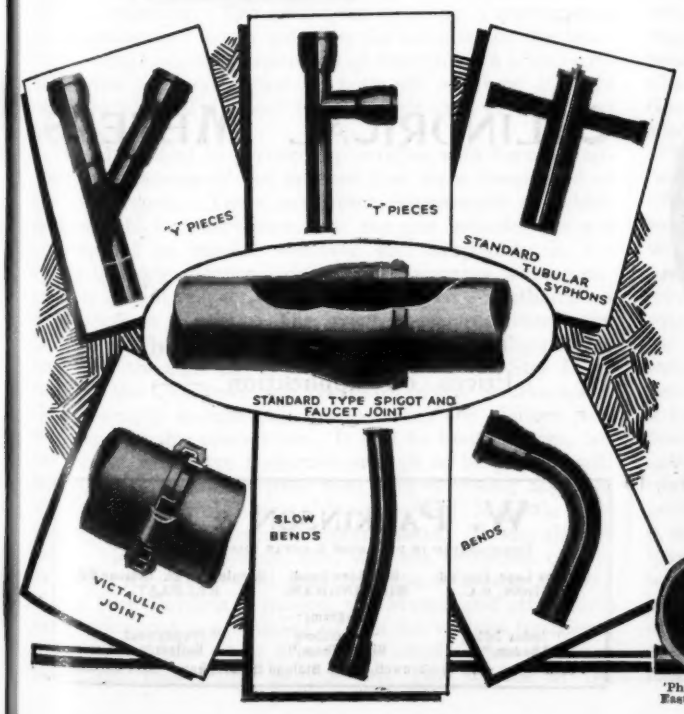
PARAGRAPHS.

Photograph of the Dinner on R.M.S. "Majestic" 111
Association of Public Lighting Engineers—Yorkshire Junior Gas Association—North of England Gas Managers' Association—Second International Conference on Bituminous Coal 126
Fuel Conference, 1928 129
Reconstruction at Dewsbury 135
Leamington Priors Gas Company 136
Co-Partnership at Watford 137
Reduced Charge at Camborne—Lower Charges at Batley—Reduction in Price at Dudley—Triple Fatality in Holland Park—Good Results at Macclesfield—Optimistic View of Trade—Gas Supply to Queensbury and Mountain—Extensions at Bangor—Cheaper Gas in Limerick—Reduction at Iron-Bridge—Mains Extension at West Bromwich—Deal and Walmer Gas Company—The Bradford Road Gas-Works Explosion—Gas Exhibition at Malton—Ministry's Inquiry into Newark Application—Inquiry at Shipley 138

"JOURNAL" OFFICE TELEPHONE.
The "Journal" Office Telephone Number is "Central 6055."

For List of "JOURNAL" Advertisers, *see* p. 142.

GREATER TUBE SERVICE



THE
Bromford
Gas Main System

provides a mainlaying installation complete to the smallest detail.

Best Quality Steel Mains specially treated in preservative solution and wrapped with impregnated jute strip.

All Types Joints, Spigot and Faucet (Long Rigid or Short Sleeve), Victaulic, Welded, Etc. Standard Tubular Syphons, Y Pieces, Tee Pieces, Bends to all requirements, Reducers and special Connections.

The Bromford System ensures a definite saving of time and money in Mainlaying, costs less in maintenance, and largely decreases loss by leakage.

'Phone: East 606. 'Grams: "Tubrom, Birmingham."

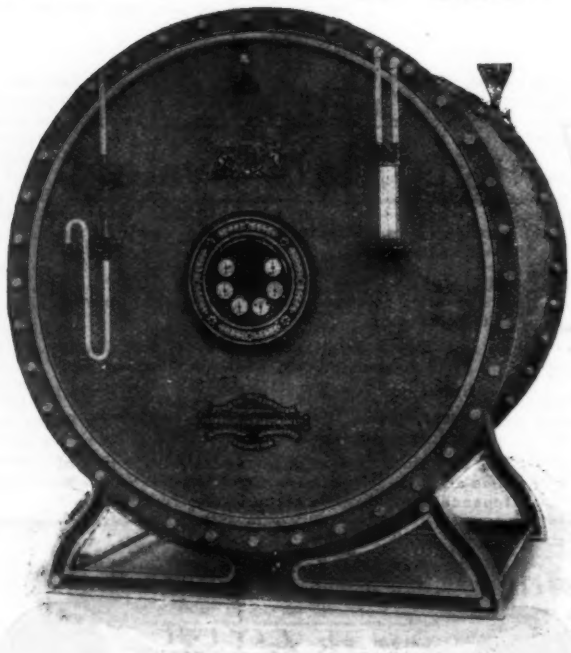
FOR
EFFICIENCY
DURABILITY
QUALITY &
ACCURACY

ORIGINAL
DRY GAS METER MAKERS
ESTABLISHED
IN 1844.

THOMAS GLOVER
ESTD & CO LTD 1844
GOTHIC WORKS, EDMONTON, LONDON. N.18.

BRANCHES AT: BELFAST,
BIRMINGHAM, BRISTOL, DUBLIN,
EDINBURGH, GLASGOW, MANCHESTER
& NEWCASTLE-ON-TYNE

PARKINSON'S



CYLINDRICAL METERS.

Tracings, Specifications, and
Prices, on application ——

W. PARKINSON & CO.
INCORPORATED IN PARKINSON & COWAN (GAS METERS), LTD.

Cottage Lane, City Rd., LONDON, E.C.1. — Bell Barn Road, BIRMINGHAM. — Mornington St., Ormeau Rd., BELFAST.

Telegrams:—
"Index Isling London." — "Gasmeters Birmingham." — "Prepayment Belfast."
'Phone Nos.: 4270 Clerkenwell. 2245 Midland Birmingham. 3374 Belfast.